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Navigating a Nightmare

In aftermath of attacks, IT rallies to keep systems running, workplaces functioning

Managers Find Preparedness Pays Off

BY MARK HALL

The utter quiet told Bob Ciurylo that something was terribly wrong.

"Tuesday morning is normally a pretty busy day in the call center," said the manager for information security at Berlin, Conn.-based Northeast Utilities Service Co. But, he said, there was "dead silence" in the IT support call center when he stepped out of a nearby conference room from a regular morning meeting.

Ciurylo learned then of the devastating series of terrorist acts that catapulted his department's disaster-preparedness procedures to the top of his company's priority list.

Across the country, IT managers like Ciurylo wasted little time double-checking their own procedures in case the horrific terrorist attacks against the U.S. last week spread beyond the now annihilated World Trade Center towers

Preparedness, page 61

THE ASSOCIATED PRESS

RESCUE WORKERS assess the overwhelming rubble of collapsed World Trade Center in New York. Recovery efforts proceed as a stunned but unbowed nation picks up the pieces.

IT Community Steps Up to Volunteer

BY MELISSA SOLOMON

First there was shock. Then panic. Then grief. Then action.

As relief workers began looking for survivors amid the rubble from last Tuesday's terrorist attacks, the IT community came together by the thousands to help rebuild the New York businesses that literally crumbled to the ground.

Many in the IT community wanted to help — with hardware, software, fully equipped office space, volunteers, consultants — but they didn't know how.

"We're just sitting here on the sidelines. We're giving blood, but what else can we do?" said Thomas M. Henricks, data processing manager at Mars National Bank in Mars, Pa. Even though his is a small community bank with just

Volunteer, page 61

Quick Link For extensive continuing coverage, go to our America Under Attack page online at: www.computerworld.com/q?a1030

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6 **FIRMS** located in New York's financial district regroup.

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8 **DAMAGED** wired and wireless networks strain as volume soars.

8 **E-MAIL,** instant messaging keep loved ones connected.

> **Some days are really, really tough days – and this was the worst of them.**
>
> BRIAN KILCOURSE, CIO, LONGS DRUG STORES

> **I don't think the public understands how well prepared we are for disasters.**
>
> ALFRED BERKELEY, VICE CHAIRMAN, NASDAQ

> **We have [one] disaster plan. We opened the book, and we followed the plan.**
>
> KEVIN STERNECKERT, CIO, BIG V SUPERMARKETS INC.

NEWSPAPER

The coveted five nines. In the past, only a precious few were allowed to see them.

99.999% uptime. For a server operating system, it's a measure of reliability that translates into just over five minutes of server downtime per year.* For your business, that means servers are up and running when people need them. Of course, rumors of this 99.999% uptime usually start under ideal lab conditions. But where are these five nines when your business needs them? If you're using Microsoft® Windows® 2000 Server–based solutions, they may be closer than you think. Today Starbucks, FreeMarkets and MortgageRamp, an affiliate of GMAC Commercial

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Networld+Interop conference plugs away. PAGE 14

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KNOWLEDGE CENTER: WIRELESS

WIRELESS HEADACHES

SPECIAL REPORT

SOME PIONEERING IT MANAGERS ARE forging ahead with wireless applications, but the challenges are immense, from security risks to scarce talent.

Special Report starts on page 23.

KATHERINE STREETER

Check out the following stories in our online Wireless Knowledge Center at www.computerworld.com/q?k1000:

▪ How to pick a wireless systems integrator ▪ Encryption: The Achilles' heel of wireless LANs ▪ How to manage the proliferation of PDAs ▪ Staff training is crucial for wireless technologies ▪ Nicholas Petreley's column: Will wireless standards prevail over chaos?

DATACENTER FACES AN UPHILL CLIMB

Microsoft's Unix challenger makes strides in first year but faces perception struggle

BY CAROL SLIWA

Microsoft Corp. has made inroads into some enterprises with the Windows 2000 Datacenter Server that it launched amid much fanfare about one year ago.

But, not unexpectedly, the company still faces a potentially lengthy, uphill climb as it tries to challenge high-end Unix systems. So far, fewer than 400 Datacenter systems are being used in production, as had been projected, said Tom Bittman, an analyst at Stamford, Conn.-based Gartner Inc.

And Microsoft still lacks the sort of high-profile reference accounts that might persuade more corporate users to deploy their mission-critical applications on the most powerful Windows server operating system to date, analysts said.

"The major benefit to Microsoft is vocal, visible references, and it's been too quiet," said Bittman, adding that he expects that to change next year.

For its part, Microsoft recognizes that it needs to be patient to crack the high-end enterprise market. "We're developing a reputation and a capability in that space, and it's going to take a while to establish that. But it's going well," said Peter Conway, senior director of Mi-

Datacenter, page 16

CATERPILLAR TO LINK SUPPLIERS

Middleware is key to collaboration plan

BY MICHAEL MEEHAN

Caterpillar Inc. is launching a major manufacturing collaboration initiative, with the realization that the project will require as much focus on new middleware as it does on supply chain management and business-to-business software.

The $20.2 billion maker of construction and mining equipment, natural gas and diesel engines, and industrial gas turbines plans to use Dallas-based i2 Technologics Inc.'s supply chain applications to share information with its suppliers as part of an effort to reduce inventories and shorten manufacturing times.

But Michael Hackerson, director of e-business at Peoria, Ill.-based Caterpillar, said the most rigorous work will involve tying hundreds of suppliers into the new system.

"You need a lot of middleware and hardware to link these companies together," Hackerson said. "Everyone's working on different systems, and you can't assume any of them can just plug into what we're building."

Caterpillar, page 16

IT Disaster Declarations Flood Business-Recovery Centers

Comdisco fields record number of requests for help following attacks

BY CAROL SLIWA

TECHNOLOGY providers that help companies recover their IT and business systems in the wake of catastrophic events saw a flood of disaster declarations and alerts in the aftermath of last week's terrorist attacks on the U.S.

By 2:15 p.m. EDT Friday, Comdisco Inc. had fielded a record 73 disaster declarations from 36 companies, primarily financial services firms in the New York area. Those totals far surpassed the 32 declarations the Rosemont, Ill.-based firm logged two years ago when Hurricane Floyd ravaged the Atlantic seaboard.

"The recoveries associated with this event are clearly the most complex and challenging — both for us and our clients — of any in our history," said John Jackson, president of Comdisco's availability services group. Eight of the recoveries involve companies that had offices in the World Trade Center.

Disaster recovery specialists such as Comdisco, SunGard Data Systems Inc. and IBM's business continuity service can completely reconstitute a company's front-office and back-office systems and provide office space in locations out of harm's way.

Businesses seeking help from Comdisco included 20 securities firms, 12 banks, two insurance companies and the New York Board of Trade, which has re-created a trading floor in Queens, N.Y. Software running in recovery centers ranged from that for trading, check processing and claims adjustment to e-mail.

By 2 p.m. EDT Friday, Wayne, Pa.-based SunGard had fielded 70 disaster alerts and seen 22 customers take the more severe step of filing disaster declarations. Requesting assistance were 16 financial services firms, two providers of business services and one each in law, health care, transportation and telecommunications.

The chief requests from afflicted companies were for work spaces equipped with PCs and telephones and support for a variety of midrange computer systems and local- and wide-area network servers, SunGard and Comdisco officials said. Comdisco also reported five mainframe recoveries, and SunGard had one.

IBM, which also has a large business continuity and recovery service, has a strong customer base in the New York area. But a company spokesman declined to provide specifics about the number of affected customers.

Comdisco's first disaster declaration came in at 9:05 a.m. EDT Tuesday, followed by a steady stream of requests. About 3,000 workers from Comdisco's 36 affected customers were relocated to 12 business-recovery facilities, including two in northern New Jersey, two in suburban Chicago and two in California. Still, a Comdisco spokesman said, the customers in place were using only about 30% of Comdisco's capacity.

The high concentration of banking and finance companies in decimated areas of lower Manhattan — coupled with the dollar value of their operations and, most important, "this wealth of people who have just been lost" — sets last week's disaster apart from any other, said Howard Levison, a co-founder of 7x24 Exchange Inc., an association of disaster-planning professionals in Harrison, N.Y. Companies typically seek disaster recovery to cope with single-building disasters, not a "simultaneous disaster to multiple buildings," Levison added.

AT SUNGARD'S crisis management center in Philadelphia, employees are working to relocate customers at various business-recovery facilities.

The World Trade Center bombing in 1993 brought eight disaster declarations to Comdisco. But Jackson said last week's disaster will prove more difficult for many companies to deal with, since this time the World Trade Center buildings collapsed and paper-based and computer records may have been destroyed.

"Back in '93, once the buildings had been stabilized, the police allowed some of our customers to re-enter the buildings, so they were able to remove PCs, servers, paper-based records," Jackson said. That's not possible now. ◗

Preparing For the Worst

The following are measures that managers can take to prepare for the unthinkable:

- ► Account for key people via phone, e-mail or other methods through an established contact plan; create a shared database of who has checked in, where they are and how to connect with them.
- ► Get key people to the IT recovery site and have alternate transport systems established. Keep in mind that airports and major roads may be unreliable.
- ► Assign responsible individuals to escort data to the recovery site.
- ► Demand that your service providers and supply chain partners have auditable recovery plans.
- ► Consider how hard-copy data, such as contracts, engineering drawings, patents and other documents, will get to the recovery site.
- ► Have top executives call top investors and customers to apprise them of the company's operating status.
- ► Make sure important data is never kept on local PC drives.
- ► Check archived data regularly to make sure that it can be processed and that your media hasn't become outdated, given your current backup systems.
- ► Certify key recovery staff through the Disaster Recovery Institute International in Falls Church, Va.

SOURCE: LLOYD R. SMITH JR., PRESIDENT OF BUSINESS AND GOVERNMENT CONTINUITY SERVICES INC., OKLAHOMA CITY

The Toll on Wall Street

Financial services firms face spending billions of dollars to replace IT equipment and software in the wake of the terrorist attack on New York's World Trade Center last week, said industry experts. But customer and business-critical data appear to have been saved by robust automated remote data-backup technologies and effective disaster-prevention strategies.

Preliminary estimates on the cost to rebuild or replace portions of the IT infrastructure for financial services companies whose offices were destroyed in the attack could range from $3 billion to $5 billion, said Larry Tabb, an analyst at Needham, Mass.-based TowerGroup.

"It looks like their disaster recovery facilities are working pretty well. That's not to say everything is backed up, because there is so much distributed technology around, like PCs," said Tabb. "The major client accounts and information is safe and secure and operating."

Piyush Singh, vice president of IT at RLI Insurance Co., said that although his company's 80th-floor office in the north tower of the World Trade Center was destroyed in the building's collapse, data loss was confined to tape backups for the previous few days. A disaster recovery plan that included routing customer calls to field offices and tapping a backup server at the company's headquarters in Peoria, Ill., ensured that its New York operations were up again by 3 p.m. Tuesday. "We ran backups from our remote data center and sent tapes to the home office," said Singh, who added that all of the firm's employees made it safely out of the World Trade Center.

RLI wasn't the only Wall Street firm prepared for a high-tech armageddon. The global financial community has created IT architectures that are fully redundant to ensure data safety, said Kelly Wester, an analyst at AMR Research Inc. in Cambridge, Mass. That includes comprehensive software, hardware and site backup.

Case in point: Blackwood Trading LLC, a brokerage firm six blocks from the World Trade Center, mirrors all of its trading data to remote technology centers in Jersey City, N.J. "It's days like this that having triple redundancy actually means something," said Mike Bogan, director of infrastructure at Blackwood. "We have a few physical locations for backup in case of terrorist attacks and acts of God."

– Lucas Mearian

Information Security Will Be Key With Lawmakers

Protecting critical infrastructure will likely overtake Internet privacy as top issue

BY PATRICK THIBODEAU
WASHINGTON

Last week's terrorist attacks are expected to shift government and legislative priorities on a host of technology issues. Internet privacy, for instance, the top technology policy issue a week ago, will likely be replaced by critical-infrastructure protection as the U.S. seeks to retaliate against what President Bush has called "an act of war."

What this means is that pending legislation to protect the privacy of corporate security incident data that's voluntarily shared with the government will likely be fast-tracked.

Antispam legislation, on the other hand, may get pushed aside, according to congressional sources and officials at trade and privacy groups.

Moreover, as a result of last week's attack, private-sector companies are likely to become a lot more receptive to collaborating with the government and one another on information security issues.

"I think there will be more collaboration — the phrase *circle the wagons* comes to mind," said Bill Riley, manager of security and disaster recovery at Johns Hopkins Hospital in Baltimore, who added that the government can do a lot to facilitate collaboration. "People get a sense about how big the risk is. It's tough to do it on your own."

To get some idea of the importance of information security in the upcoming policy debate, consider this: One of the first hearings Congress held the day following Tuesday's attack was on critical infrastructure protection. Sen. Joseph Lieberman (D-Conn.), who headed the committee hearing, said a "new era" in protecting national security — including cybersecurity — has arrived. Although the hearing had been previously scheduled, what was remarkable was that it was even held, since many others were postponed.

There's no doubt that the nation has entered a new era. But there are also worries that a shift in balance from privacy to security could give rise to some contentious issues.

"There will be some misguided calls for more of a surveillance society," said Lance Hoffman, a professor of computer science at The George Washington University in Washington. "And I think if we succumb to these, we give the attackers a victory by giving up too much privacy and autonomy."

U.S. officials have tried often to get more surveillance power where electronic communications are concerned. For example, the Clinton administration, worried about its ability to decrypt electronic messages sent by suspected terrorists and criminals, pushed for an FBI-backed plan to give law enforcers mandatory key escrow, a backdoor means for giving law enforcement the ability to decrypt intercepted messages. The proposal failed in a wave of public opposition.

"Key escrow would not have prevented what took place," said Marc Rotenberg, executive director of the Electronic Privacy Information Center in Washington. "And the rush to establish Draconian security controls may do very little to provide greater safety for Americans. They would, however, provide a great cost in terms of freedom." ◗

How War Would Affect Tech Policy

Last week's attacks against the U.S. are expected to affect technology policy in several ways.

Internet privacy

Before: It may have been the top technology issue, with a lot of legislative interest but no clear timetable for action.

After: Information security will likely become the top issue for a country at war.

Government surveillance

Before: Not too long ago, Congress looked at legislation to make it harder for law enforcers to get wiretaps. There has also been growing legislative opposition to the use of pervasive police surveillance techniques, such as cameras to locate crime suspects at the Super Bowl.

After: Congress may look at ways to make it easier for police to monitor electronic communications. Watch for legislation that gives investigators expanded electronic surveillance powers.

Critical infrastructure

Before: The government has played cheerleader, trying to persuade companies to voluntarily improve information security and collaborate in sharing threat and incident data.

After: Government can stop playing cheerleader. The voluntary participation incentive is obvious. But the threat of mandatory compliance is out there.

Online Resources

Resources have inundated the Web, offering information and services related to last week's terrorist attack. Here are some useful highlights:

Cash donations

▶ Salvation Army: *https://secure.salvationarmy.org*

▶ Amazon.com: *http://s1.amazon.com/paypage/PKAXFNQH7EKCX*

▶ United Way's September 11 Fund: *https://www.uwnyc.com/epledge/sept11.cfm*

▶ American Red Cross: *https://www.redcross.org/donate/donation-form.asp*

General assistance

▶ Helping.org: *www.helping.org*

▶ Volunteer IT: *www.computerworld.com/cwi/story/0,1199,NAV47_STO63804,00.html*

▶ Voluntech: *www.voluntech.org*

Survivor/victim lists

▶ World Trade Center Survivor Database: *http://www.ny.com/wtclist.html*

▶ Victim information: *http://victiminformation.com/*

▶ Patient locator: *http://63.209.170.9/wtc/search.asp*

Relief efforts

▶ Federal Emergency Management Agency: *www.fema.gov*

▶ New York State Emergency Information: *http://www.state.ny.us/sept11/wtcframe.html*

Helping Your Employees Through Times of Crisis

Let them talk it out, professionals advise

BY KATHLEEN MELYMUKA, MELISSA SOLOMON AND KIM S. NASH

In the aftermath of a disaster, the most difficult issues for IT managers to cope with often have nothing to do with technology.

"The biggest problem we've ended up having to deal with is getting everyone to stay on task, myself included," said Brian Kilcourse, CIO at Longs Drug Stores Corp. in Walnut Creek, Calif.

"It's a tragedy of immense proportions, and everyone needs to work through it," he added. "We try to be sensitive to the fact that some days are really, really tough days — and this was the worst of them."

Helping people work through it will be important for IT managers in the days and weeks to come. "I'm sure American business is feeling a lack of productivity because we're all preoccupied with this," said Joseph Dadourian, a Los Angeles-based workplace psychologist and director of clinical services at QuickSanity LLP in Los Angeles, which provides Internet-based psychological services for companies.

"We're all different, and everybody's going to handle it differently," said Dadourian during a break from helping an IT group in California deal with their grief. "One woman was crying profusely today; someone else told a joke."

"Let them have the reaction they're having, and that's going to help them get through it faster than anything," said Eileen Strider, a principal at Strider and Cline Inc., a Kansas City, Mo.-based firm specializing in organizational effectiveness. "Companies are crazy if they think they can tell people to put their heads down and get to work."

And don't worry that you're not trained for this. "No one has the answers," said Jean McLendon, an organizational consultant and psychotherapist in Chapel Hill, N.C. "The manager needs permission to stumble along." There's no single way people are supposed to feel, she said; your job is to allow people to express what they're feeling without any judgment.

But as you listen, be careful of your reactions, said Dadourian. Don't feed rumors, and don't speculate about the unknown. Also, remember that everyone is different, he advised, and be careful about saying you know what someone is feeling. Because most likely, you don't. ◗

WHAT TO DO

Tips to Help Workers Cope

✓ Let them talk.
✓ Don't judge their reactions.
✓ Loosen restrictions on phone/e-mail.
✓ Don't feed the rumor mill.
✓ Be understanding, but focus on work.
✓ Let them brainstorm how to help.
✓ Re-examine your security plans.
✓ Revisit your travel expectations.
✓ Be patient; this isn't over yet.

Nation's Networks See Sharp Volume Spikes After Attacks

Wireless networks handle increases in wake of loss of high-speed circuits in New York

BY BOB BREWIN

THE NATION'S wired and wireless communications networks last week managed to handle sharply increased traffic, which spiked 400% above normal on some networks immediately after the terrorist attacks on New York and Washington. This was the case despite the fact that the collapse of the World Trade Center knocked out switches and fiber circuits in the building's basement and destroyed cellular telephone towers in lower Manhattan.

The Pentagon's global command and control network, the Defense Information Systems Network (DISN), provides voice, data and video services over separate classified and unclassified Synchronous Optical Networks (Sonet), which are provided by WorldCom Inc. Both operated without outages, according to Betsy Flood, a spokeswoman for the Arlington, Va.-based Defense Information Systems Agency, which operates the network.

"We've had no problems with the DISN," said Flood. DISN is the successor to Arpanet, the original Internet designed to route traffic around network nodes destroyed in an attack.

WorldCom lost service on 200 high-speed DS-3 circuits carrying commercial traffic through the World Trade Center's basement, but the self-healing Sonet rings that WorldCom uses helped to quickly restore service, said Diana Gwen, vice president of the company's government markets division.

TEMPORARY cell towers were erected to replace downed towers after last week's terrorist attacks.

Verizon Communications in New York, the local carrier that serves New York and Washington, as well as Sprint Corp. and AT&T Corp., also had switches in the basement of the World Trade Center. The collapse of the building initially caused traffic disruptions, but by the end of the week, all reported that rerouting had restored network operations to normal.

Cellular carriers reported unprecedented calling volumes in the hours after the attacks. Peter Nilsson, a spokesman for Cingular Wireless in Atlanta, reported that usage on the company's network surged some 400% above normal in the first few hours after the attack. The day after the attack, volumes had dropped to 20% above normal, Nilsson said.

The major cellular carriers, including Redmond, Wash.-based AT&T Wireless, Verizon Wireless and Cingular, all deployed temporary Cellular on Wheels Systems (COWS) to New York and Washington to replace downed cell towers and provide communications to emergency personnel.

Andrea Linsky, a spokeswoman for Verizon Wireless, said COWS are housed on trailers, which incorporate base-station electronics and telescoping antenna masts that can go as high as 60 feet. Linsky said Verizon has three COWS in service in the New York/New Jersey area, two in Washington and one in Pennsylvania, near the crash site of one of the hijacked aircraft.

Cingular Wireless has three COWS in operation in Washington, and AT&T Wireless has six in the New York area.

Spokesmen for both wired and wireless communications companies emphasized that although their networks handled a surge in traffic after initial disruptions, the public could help by limiting their calls. ▶

Internet Messaging Keeps Businesses, Employees in Touch

Phone circuits were jammed, and cell phones couldn't handle the increased traffic last week. Frustrated at the inability to connect, many people found human reassurance from lines of simple text, transmitted over the Internet.

"Our folks have been using electronic messaging to stay in touch with colleagues, loved ones and to even help come to terms with what is happening," said Eugene Stein, a lawyer and director of information and professional services at Shearson & Sterling, a law firm in midtown Manhattan. The firm has more than 1,000 lawyers in all of the world's financial centers.

"There has been no noticeable impact on our systems as a result of this increase in traffic," Stein said.

Rich Schineller, a spokesman for 3rd Millennium Management in Wayne, N.J., said he was able to connect with workers in the company's New York office through e-mail Tuesday, via a T1 line. 3rd Millennium has offered to manage communications services for companies affected by last week's terrorist attacks at no cost. Schineller said he has sent out 200 e-mails telling companies to reassure employees that their direct-deposit paychecks will go through as they usually do, for example.

Stephen Northcutt, an attendee at a SANS Institute conference in Boston last week, recounted one use of instant messaging.

"[It] kept running without a hitch," he said. "We had a bunch of stranded Secret Service and FBI agents [who were attending a convention down the hall], and we let them use our wireless access point and wired switches. They were staying in touch and getting their assignments via [instant messaging]."

America Online Inc. in Dulles, Va., said it saw a record-high number of messages on its free service, AOL Instant Messenger (AIM). With both the 700 million messages on AIM and the AOL subscribers using the same instant messaging technology, AOL tallied 1.2 billion chat messages last Tuesday.

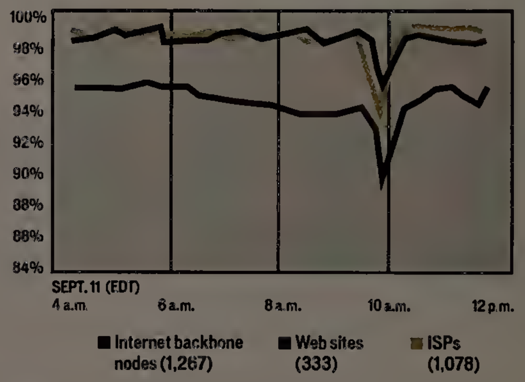
Microsoft Corp.'s competing free instant messaging service, MSN Messenger, also saw a spike in usage, said Sarah Lefko, MSN lead product manager.

There was still a way to find the comfort of a human voice without the phone lines. Columbia University coordinated with Lawrence Berkeley National Laboratory, OARnet, Ohio State University, Penn State University RADVision, Texas A&M, the University of North Carolina and the University of Pennsylvania to offer voice over IP links from New York to other locations around the country.

– Jennifer DiSabatino

What Happened on the Internet?

Internet availability dropped sharply after the attack on the World Trade Center, which was close to three major switching and routing facilities. But performance improved after traffic was rerouted.



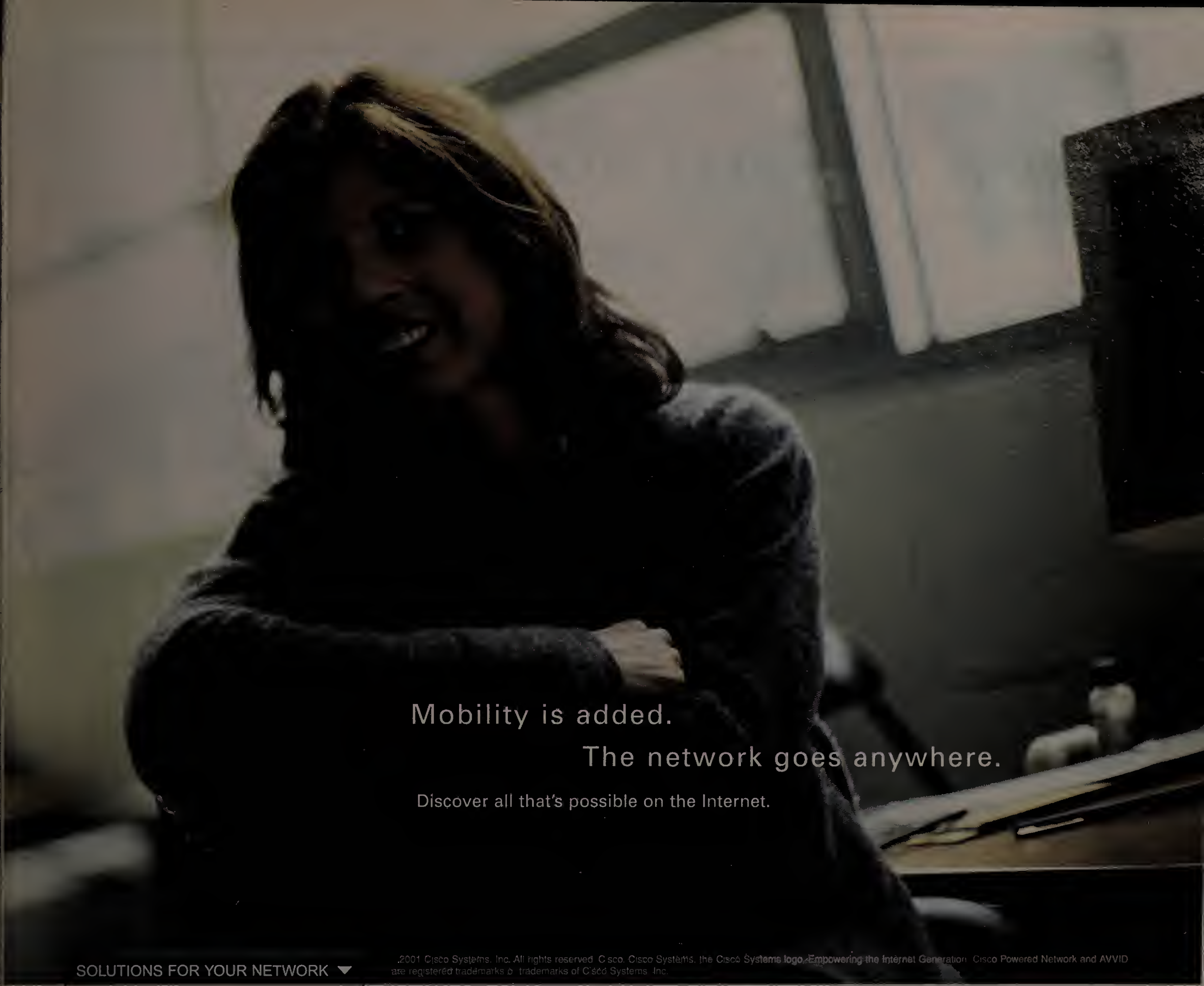
SOURCE: MATRIX.NET INC., AUSTIN, TEXAS

Average response times at major online news sites last Tuesday morning (in seconds):

	8-9 a.m. EDT	9-10 a.m. EDT
ABCNews.com	6.1	114.77
CNN.com	3.88	Unavailable*
MSNBC.com	1.46	38.95
NYTimes.com	3.56	271.68
USAToday.com	1.65	133.07

* Site unreachable during this period due to overload.

SOURCE: KEYNOTE SYSTEMS INC., SAN MATEO, CALIF GRAPHIC COMPILED BY TODD R WEISS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ONLINE

AMERICA under ATTACK

Continuing Coverage
For the latest *Computerworld* coverage of the attack on America, head to our special coverage page.
www.computerworld.com/q?a1030

How You Can Help
Do you want to donate IT goods or services to help New York recover from the World Trade Center attacks? *Computerworld*'s Volunteer IT program is collecting the specifics of such offers from organizations and individuals. To register, go to our Web site.
www.computerworld.com/volunteer

Quick Link For breaking news, updated twice daily at noon and 5 p.m., visit the *Computerworld.com* Web site:
www.computerworld.com/q?q4000

SPECIAL REPORT

KNOWLEDGE CENTER: WIRELESS

23 Wireless Headaches
IT managers are forging ahead with wireless applications, despite problems such as security risks, a proliferation of devices, scarce talent and a lack of standards. This month's Knowledge Center special report offers a huge collection of stories — in print and online — on wireless technologies of all sorts, from wireless LANs to e-mail gadgets. The stories identify the barriers and unfulfilled promises of wireless, as well as the creative ways that IT managers are coping.

24 In Search of the Killer App
The successful wireless applications in corporate America are the unsexy ones, including wireless LANs, mobile e-mail and field service automation.
ONLINE: As companies plot out wireless projects, they often neglect to figure out their metrics for ROI and cost control.
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26 Unfulfilled Promises
With wireless networks, you can get either usable speed or wide coverage, not both. This story is accompanied by a useful chart describing the key technologies and their limitations.
ONLINE: Wireless personal-area networks are hitting the streets, with Bluetooth leading the way.
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28 The Mobile Access Puzzle
The pieces are all there to connect mobile users to back-office systems. The trick is getting them to fit together.

34 Bridging the Long Last Mile
For remote locations, Internet connections require some ingenuity, such as fixed wireless technology, satellites and even lasers.

36 Coping With Development Chaos Early adopters such as Corrugated Supplies' Dave Pung are cobbling together wireless applications with a hodgepodge of tools and no standards to guide them.

38 Secrets in the Air
Many companies have no idea that unsecured wireless gear is coming in the back door — and that they're broadcasting company secrets to hackers in the parking lot. It's time for IT security managers to do something about it.
ONLINE: Encryption is the Achilles' heel of wireless LANs.
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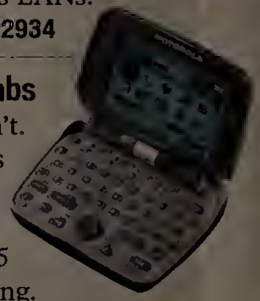
40 Ready for All-Thumbs Typing? Russell Kay isn't. He reviews two wireless e-mail devices — RIM's BlackBerry 957 and Motorola's TimePort 935 — and finds them wanting.



46 Grow-Your-Own Wireless Talent Wireless talent is scarce, but companies are willing to train employees in wireless skills, or at least those employees who already have IT and business savvy.
ONLINE: Advice for starting a wireless training program in your company.
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ALSO IN THIS WEEK'S KNOWLEDGE CENTER:

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48 Cultural and legal barriers add to the complexity of wireless projects.

50 Don't believe the press releases from wireless vendors, says consultant Alan Reiter.

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Standards Paradox
What concerns columnist Nicholas Petreley about wireless isn't bandwidth or cost — it's standards, or the lack of them. Will logic or chaos prevail? Read his provocative column.
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Managing the proliferation of PDAs is essential. You need a policy because they're real business computers — they aren't just toys anymore. The key questions: Who buys them, who supports them and who owns the data?
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Systems Integrators
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Oracle, User Group Unsettled on Events

Conference dispute continues with OAUG

BY MARC L. SONGINI

THE ORACLE Applications Users Group (OAUG) and Oracle Corp. remain divided over who should control the conferences aimed at users of the company's business applications, nearly three months after talks for resolving the feud took place.

The Atlanta-based OAUG was due to hold its fall conference in San Diego this week without any participation by Oracle, but last Friday afternoon the user group decided to postpone the event until late November because of the terrorist attacks in New York, Washington and Pennsylvania.

Oracle is refusing to take part in the OAUG's biannual conferences and has proposed that they be folded into its own AppsWorld event — a suggestion that the independent user group has rejected thus far.

In late June, the OAUG began a new survey of how its members want to proceed, and a spokesman for the user group last week said the survey has now been completed. He wouldn't comment on the results and said he's not sure when they will be disclosed.

The OAUG is at a crossroads, said Joshua Greenbaum, an analyst at Enterprise Applications Consulting in Daly City, Calif. But Oracle shouldn't be too cavalier about its relationship with the OAUG, he added.

"Oracle can't run its applications business without the goodwill of its customers, and that means mending fences with the OUAG," Greenbaum said. "I think Oracle will figure this out sooner or later."

Oracle didn't respond to several requests for comment on its dispute with the OAUG.

Some OAUG members are especially rankled that Oracle is staying away from the group's conferences at a time when users are facing a major upgrade to the E-Business Suite 11i applications released by the vendor last year.

"I was looking forward to [Oracle developers] being present to talk about their products," said Hem Chari, an IT analyst at General Electric Co.'s Atlanta-based GE Power Systems unit. In particular, Chari said, he wants to see what Oracle offers to facilitate e-commerce functionality.

GE Power Systems runs Oracle's purchasing software and plans to migrate to 11i within the next two years, Chari added.

The OAUG spokesman said Oracle business partners will be able to showcase its products at the group's conference. ◗

IBM Adds Servers to Bolster Midrange Line

New capabilities give vendor an edge

BY JAIKUMAR VIJAYAN

IBM last week boosted its midrange Unix server lineup with new models featuring faster processors and new reliability and management technologies developed under a wide-ranging IBM software development program called eLiza.

According to IBM, the new eight-processor eServer p660-M1 system delivers almost 60% more raw processing power than the company's current M80 model in the same family of Unix servers.

Delivering much of that performance are new 750-MHz Power3 chips that feature IBM's copper and silicon-on-insulator (SOI) technologies, and enhanced memory management technologies, claimed Chuck Brian, an IBM director.

Among the management capabilities available on the new server is one for predictive failure analysis that enables a system to self-diagnose potential hardware problems and alert IT staffers about it, Brian said. A similar capability on the software side automatically predicts and alerts staff members about software failures. Rounding off the reliability features are things such as IBM's Chipkill technology, which is designed to deal with memory-based system failures. Also available is a dynamic processor de-allocation function for automatically reassigning tasks from a failing processor.

These features have been migrated down from IBM's mainframes into the midrange space as part of the eLiza project.

In keeping with the trend established by rival Hewlett-Packard Co. in the midrange Unix server space, IBM's new boxes also offer a capacity-on-demand feature. Using it, customers can quickly activate additional processors on the system as needed.

The capabilities of the new servers give IBM's midrange Unix technology an edge over comparable boxes from rivals such as HP and Sun Microsystems Inc., claimed Kevin Smith, CEO of MDoffices Inc. The New York-based start-up company delivers a service that enables physicians to transmit prescriptions and other medical information via wireless devices.

"We looked at various vendors and eventually made a decision to go with IBM for two reasons," Smith said. "Their technology allows us to run [the servers] on much less power than competitors, and they offered us a lease arrangement under which we don't have to pay anything for the first six months." Smith said he expects to install the servers early next year.

Southern Pipe and Supply Co., a Meridian, Miss.-based wholesaler of plumbing and heating equipment, decided to go with IBM's new servers because it liked the vendor's long-term Unix road map, said IT director Johnny Dean. Southern, which currently uses Unix servers from Westboro, Mass.-based Data General Corp., plans to migrate to IBM's new servers in the next several weeks, he added.

Features such as Chipkill, SOI and capacity upgrades on demand, in particular, were crucial factors behind that decision, Dean said.

Both Sun and HP, which is the market leader in the midrange Unix space, are planning major new upgrades to their own lineups. Sun's high-end UltraSPARC III-based servers are expected to be released later this month, while HP's refresh is scheduled for this week. ◗

Server Facts

IBM's eServer p660M1:

- ▸Is based on 750-MHz RS64 IV processors
- ▸Supports up to eight processors
- ▸Features capacity upgrades on demand
- ▸Integrates service processors to monitor system operation
- ▸Includes predictive failure-analysis capability

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Lotus Debuts Sametime 2.5 Upgrade

Changes based on customer feedback

BY JENNIFER DiSABATINO

Lotus Software Group, the IBM subsidiary formerly known as Lotus Development Corp., released on Sept. 7 Version 2.5 of its instant messaging software and server, Sametime.

Jeremy Dies, real-time offerings manager at Lotus, said the upgrade is the result of customer feedback, specifically regarding the need to use Sametime outside the firewall.

"Sametime 2.5 added new firewall and proxy configurations to make it easier to connect with external collaborators," he said. Directory and presence information are still private and restricted to users given authorization by an administrator, Dies said.

The upgrade also allows developers to save and store chat sessions by default or by user choice to most database systems. Other users can then query the database to get information from those chat sessions. The difference in this version is that an application programming interface automatically translates the Sametime chat session to be stored in the database language. However, database developers would have to make allowances for those users in a different environment who are inputting data and making queries into the database. ◗

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Novell Set to Release NetWare 6 in October

Users won't need client software on PCs

BY JAMES COPE
ATLANTA

NOVELL INC. LAST week announced plans for a mid-October release of NetWare 6, a new version of the struggling company's network operating system that's supposed to free users from the need to install NetWare client software on their PCs.

NetWare 6, which went into controlled beta-testing last summer and was originally due for shipment in the first half of this year, also includes several new Web-based network access features (see box). The software has a list price of $184 per end-user license, according to Novell officials.

Jack Messman, who took over as Novell's president and CEO two months ago, said at the fall Networld+Interop conference here that the new release can manage files in their native operating system formats. As a result, NetWare 6 "is additive," he said. "It can be deployed into any network without ripping out and replacing existing software."

Beta-tester Matt Krieger, associate director of global network architecture services at Reader's Digest Association Inc. in Pleasantville, N.Y., said he was impressed by the iPrint feature included in NetWare 6. The Internet-based tool lets end users print documents on remote printers via the Internet.

Krieger said Reader's Digest also plans to test NetWare 6's iFolder technology, which can be used to synchronize files among different computers and networks. "Keeping folders synchronized among laptops has always been a nightmare," he said, noting that iFolder may let Reader's Digest reduce the number of remote file servers that it now runs.

Novell, once the top vendor of network operating systems, is trying to recover from a continuing series of losses, revenue declines and layoffs. As part of its turnaround effort, the company is moving to reduce its reliance on sales of packaged software such as NetWare.

The plan is to focus more on networking services and consulting. To that end, Novell this summer acquired Cambridge, Mass.-based consulting firm Cambridge Technology Partners Inc. and named Messman to take over as its CEO. He had previously headed Cambridge Technology Partners.

At Networld+Interop, Novell also announced that Sunnyvale, Calif.-based Yahoo Inc. will make the networking vendor's eDirectory software the default directory server in its enterprise portal aimed at corporate users. Directory servers identify users and determine network access rights.

Jim Fanella, senior vice president of business and enterprise services at Yahoo, said the Novell technology will replace a directory server made by iPlanet E-Commerce Solutions, a Palo Alto, Calif.-based alliance between Sun Microsystems Inc. and Netscape Communications Corp. ◗

New in NetWare

Features being added as part of NetWare 6 include the following:

NetWare WebAccess: Supports browser-based access to files, printers, e-mail messages and other services through a customizable Internet portal

iFolder: Lets users securely access and synchronize files on multiple types of networks from any Internet-enabled computer

iPrint: Allows browser-equipped mobile users and other workers to locate, configure and use printers via the Internet

Native file access: Makes files manageable in native formats, eliminating the need to install Novell client software on PCs

Avaya's CEO Offers Insight From Economic Disruptions

The service provider and enterprise networking markets are markedly different, and the current economic downturn is further highlighting those variances, according to Don Peterson, president and CEO of Basking Ridge, N.J.-based Avaya Inc., formerly the enterprise networking arm of Murray Hill, N.J.-based Lucent Technologies Inc.

Last week, at Networld+Interop in Atlanta, Peterson discussed these differences and issues affecting enterprise network customers with *Computerworld*'s James Cope.

Q: You said in your keynote address that there are very different dynamics at work in the service provider and enterprise networking markets. What are those differences?

A: Well, the telecom or carrier space, in my view, is a far more volatile area than the enterprise. There are fewer buyers, for one. And if you look back in recent history, there's a high probability of [different carriers] making the same purchasing decision at the same time.

For example, when telecom companies installed 10-gigabit cross-connects on their wide-area networks, Nortel soared on the volume of equipment sold. The reality is that spending by telcos tends to move from network bottleneck to bottleneck. So, there's a spike in spending, followed by a contraction in spending. This makes selling equipment to carriers a very lumpy business.

PETERSON: The first lesson is return on investment.

Q: So, if the service provider business is "lumpy," does that make enterprise sales smooth?

A: Let's say the downturn in telco spending makes me grateful that I've moved into the enterprise side of networking. Enterprises continue to offer significant opportunities for companies like Avaya.

Overall, though, the [customer company] CFOs and CEOs are saying, "I don't know what we can afford; let's slow down." Purchases haven't stopped, but many are being held. Everything is just sort of pending.

Q: When will networking customers start buying again?

A: If budgets set during this time of contraction aren't used soon, then spending plans will roll over into next year's budget. This is the problem scenario. But [purchasing] could turn on very quickly, too. We'll know which way it goes over the next couple of quarters.

Q: You mentioned in your keynote address that there are several lessons to be learned from what you call "market and economic disruptions." Could you please elaborate?

A: The first lesson we should learn is the importance of return on investment. Enterprises should take a lesson from the telcos — reuse technology and then evolve from there to new technologies.

Second, companies should really have a compelling purpose for deploying IP technologies. Think about the application and what it will do for the company. And the third lesson is "think velocity instead of speed," because velocity implies direction as well as the rate of movement. ◗

Networld+Interop Tries Wireless Net

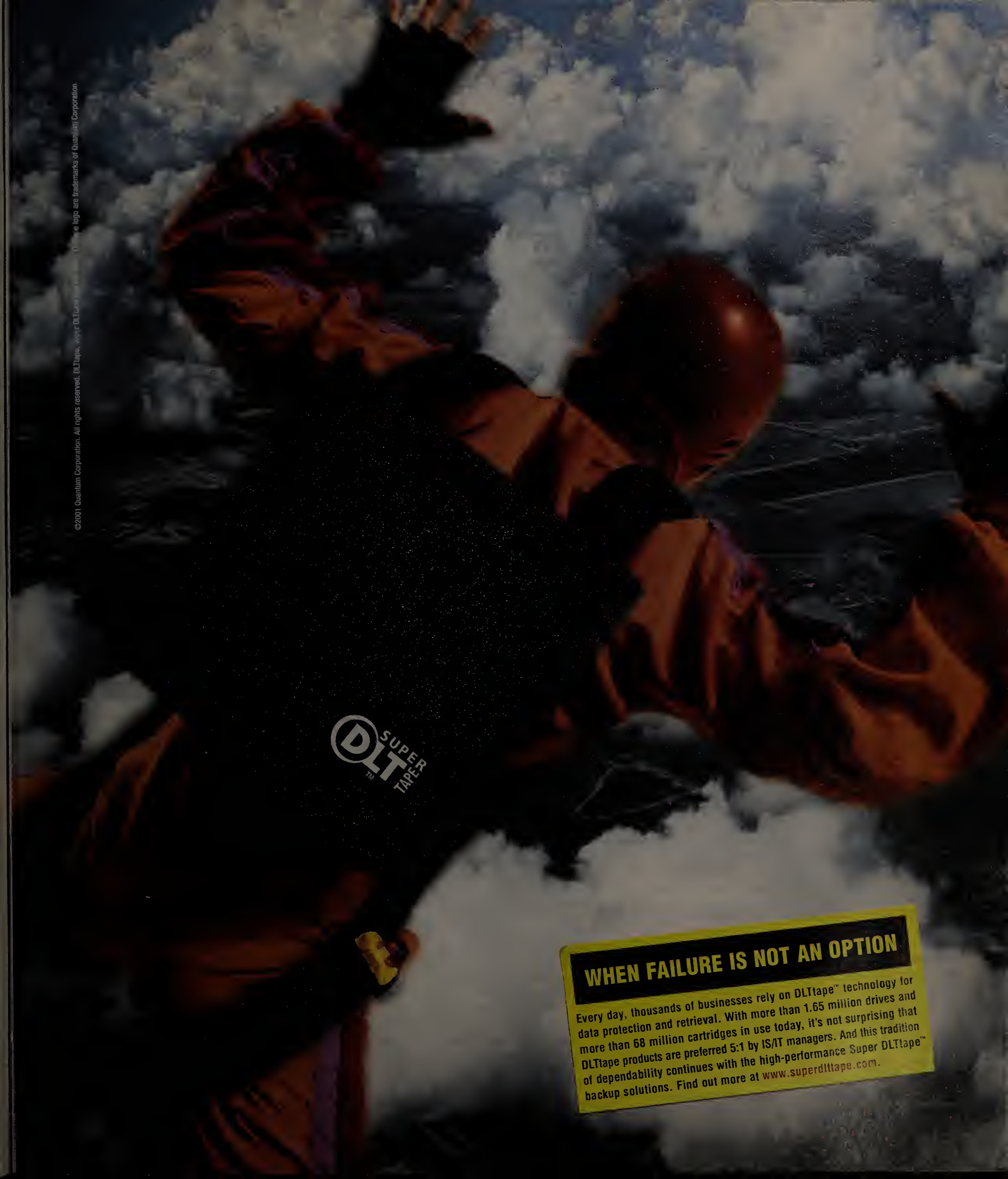
Symbol Technologies Inc. passed out 11M bit/sec. wireless LAN cards like popcorn at Networld+Interop and set up wireless access points throughout the Georgia World Congress Center to give attendees with laptops untethered access to the Internet and the network supporting the show.

The wireless technology, based on the 802.11b standard, was set up by Holtsville, N.Y.-based Symbol Technologies in conjunction with the show's organizers. A company spokesman said the wireless products vendor wanted to give attendees the experience of using wireless systems inside a large facility.

Tests conducted by *Computerworld* showed that the wireless connections were easy to set up and performed well. But many attendees said they couldn't be bothered with installing the drivers for the wireless cards and relied instead on dial-up analog connections via phone lines.

The Networld+Interop network went down briefly last Wednesday, temporarily disrupting the wireless connectivity. But technicians said the outage had nothing to do with the wireless infrastructure. It was caused by someone at the show tripping on an optical cable, they said.

– James Cope



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BRIEFS

Microsoft Files New Supreme Court Brief

Microsoft Corp. submitted a second legal filing to the U.S. Supreme Court as part of its effort to overturn antitrust case rulings made last year by U.S. District Court Judge Thomas Penfield Jackson. Microsoft rejected arguments made by government lawyers in a response to its first filing, which criticized the U.S. Court of Appeals for not disqualifying Jackson's major findings.

Oracle Income Up; Revenue Inches Down

Oracle Corp. reported net income of $510.6 million for its first quarter ended Aug. 31, up 2% from $500.7 million in the same period a year ago. But revenue dipped from $2.26 billion to $2.24 billion, and software sales fell 9%. Oracle declined comment on the results, citing last week's terrorist attacks.

HP Readies Three New Business PCs

Hewlett-Packard Co. said it plans next month to ship three new desktop PCs aimed at business users, including a slimmed-down modular system that starts at $579. HP is also consolidating its business PC offerings into a pair of high-end and low-end product lines.

Short Takes

In the wake of last week's terrorist attacks, MICROSOFT CORP. and the Chicago-based PROFESSIONAL ASSOCIATION FOR SQL SERVER postponed a conference for users of the company's database that was scheduled for this week in Orlando. . . . Pleasanton, Calif.-based COMMERCE ONE INC. rescheduled its user conference from this week to early November. . . . QUMAS INC., a Florham Park, N.J.-based maker of regulatory compliance management software, canceled a user conference that was set for Chicago.

Continued from page 5

Datacenter

crosoft's Windows .Net server group.

While Windows Datacenter is well regarded among analysts, Microsoft faces an ongoing perception struggle in convincing corporate users that the operating system is scalable and reliable enough to handle their enterprise needs, analysts said.

Analysts said they're not seeing many companies rip out Unix systems in favor of Windows Datacenter. Instead, users are more typically consolidating multiple Windows servers into one Datacenter-equipped box or running new applications on Datacenter.

"There's a reality here of infrastructure and skills that are already in place in companies, and you don't rip out and replace your infrastructure and skills," Bittman said.

"The market it is challenging views Datacenter as an immature product," said Rob Enderle, an analyst at Cambridge, Mass.-based Giga Information Group Inc. Also holding back Datacenter are the slow arrival of Intel Corp.'s second-generation Itanium processor, Microsoft's pricing changes and the economy, he said.

"Overall, the market downturn has made it very difficult to move from technology to technology," Enderle said. "Datacenter is a challenging product, and it's going against entrenched offerings. Getting the budget to even do evaluations is much more difficult than it was a year ago."

Some Blaze Datacenter Trail

But some companies have elected to blaze the Datacenter trail. Technology and Information Services (TIES), a St. Paul, Minn.-based nonprofit consortium of 36 Minnesota school districts, next month plans to start running its 250,000-student information system on a Windows 2000 Datacenter-loaded ES7000 server from Blue Bell, Pa.-based Unisys Corp. TIES will use 24 processors for Datacenter and the rest for testing software.

The consortium said it even plans to eventually move its financial accounting, payroll and human resources systems off its mainframe onto the Datacenter-loaded ES7000.

"Datacenter has many of the attributes that we've been used to having in the mainframe environment to ensure that we have a reliable computer environment," said Lee Whitcraft, co-executive director of TIES, adding that Datacenter's "marriage" with the scalable, reliable ES7000 "is the only reason we considered moving."

Whitcraft explained that TIES's business is increasing, and that adding 15% capacity to its mainframe might cost more than $1 million, compared with $350,000 to $400,000 for the Datacenter-loaded ES7000 environment.

"Even if we're wrong by 20% to 25%, we're still going to be much less costly," he said.

But there aren't many companies running Windows 2000 Datacenter, which is sold only through computer hardware makers, on 32-processor machines.

Unisys is currently the only vendor shipping Windows 2000 Datacenter on boxes with more than eight processors, and only 28% of its customers run Datacenter in a 32-way environment, said company spokesman Steve Holzman.

Microsoft last week announced a 32-bit Datacenter Server Limited Edition Release, tuned and optimized for high transaction demands, to run on single-server machines with 16 or more processors.

So far, only Unisys has signed on as a partner, but Conway said two additional partners should be in tow by the time the product is available in the first half of next year. Also due in that timeframe are the full 32- and 64-bit versions of Windows .Net Datacenter Server.

Last year, Compaq Computer Corp. and Hewlett-Packard Co. had announced a plan to resell Unisys' 32-processor boxes equipped with Datacenter, but both vendors backed down from that plan earlier this year.

"The reason we are no longer selling the Unisys [reseller] server is based on the lack of customer acceptance and the lack of scale-up applications for a 32-way server," said Robin Hensley, director of Compaq's data center group.

But Hensley said that Compaq has a development program under way for a 32-way server based on the second-generation, 64-bit Itanium processor. Hensley added that her company foresees "a very long life for the 32-bit" Datacenter product, which Compaq now sells on its ProLiant eight-way box.

"Datacenter has met our expectations. We are hitting the types of accounts in the enterprise that we expect to reach," Hensley said, noting that her largest customer, a global financial institution, runs disaster-tolerant clusters in multiple locations.

Compaq, Unisys and Microsoft all declined to provide numbers of customers using Datacenter. ◗

Timeline

Microsoft's Datacenter rollout:

Feb. 15, 2000
Microsoft announces Windows Datacenter Program.

July 17, 2000
Compaq is certified as the first partner for the Windows Datacenter Program.

Aug. 11, 2000
Windows 2000 Datacenter Server is shipped to hardware makers.

Sept. 26, 2000
Microsoft officially launches Windows 2000 Datacenter; Compaq, Dell Computer, Hewlett-Packard, IBM and Unisys announce systems running the new operating system.

March-April 2001
HP and Compaq decide to stop reselling Unisys' high-end ES7000 server for Windows 2000 Datacenter.

Sept. 9, 2001
Microsoft announces Windows Datacenter Server Limited Edition for single-server machines operating with 16 or more processors.

Continued from page 5

Caterpillar

That's where IBM enters the equation. Its professional services division is being brought into the Caterpillar project to handle systems integration. According to Bruce Anderson, managing principal for industrial sector consulting at IBM, supply chain collaboration marks a huge opportunity for services firms.

"When you choose to collaborate, you cannot escape the fact that you've now changed the business process," he said. "Different people have to be notified and different actions triggered, and you have to be able to describe those processes to the middleware so it can send things to the right place."

In Caterpillar's case, middleware functions will be handled by IBM's WebSphere application server. Anderson said such projects also may prompt IBM to change the way WebSphere is priced and designed.

The company is considering pay-as-you-go pricing methods, such as usage-based or a la carte pricing, he said. It might also develop a limited-functionality version of the application server for companies that need only some of the basic features of the technology.

"We're going to have to be flexible, because there's no one-size-fits-all way to set up a collaborative network," Anderson said.

Caterpillar plans to start linking suppliers to its network by the end of the year, and executives at the company said they believe that the integration work is a necessary precursor to lowering its manufacturing costs.

"We've already knocked down the prices we pay to our suppliers as much as possible," Hackerson said. "We've got to come up with a better way of doing business for both sides if we want to eliminate costs down the road." ◗

Bluetooth Backers: Wireless Technology Late but Viable

Differences cited with 802.11b standard wireless LANs

BY MATT HAMBLEN
BOSTON

BLUETOOTH WIRELESS technology is hitting the market a year late, officials from backer LM Ericsson Telephone Co. acknowledged this month. But they insisted that the delay doesn't mean that user acceptance of Bluetooth will be blocked by 802.11b wireless LANs.

Bluetooth and 802.11b "are complementary technologies," said Skip Bryan, global area manager for the Americas at Ericsson Technology Licensing, a division of Sweden-based Ericsson. "There is no war [between the two technologies], so there is no war to lose," he added during a session at the Embedded Systems Conference here earlier this month.

The 802.11b technology has caught on faster in the U.S. But Ken Dulaney, an analyst at Gartner Inc. in Stamford, Conn., agreed that it and Bluetooth aren't directly competitive. "They should not be put in the same bucket," he said.

By the time Bluetooth is widely available, he added, many users will likely have moved beyond 802.11b and shifted their wireless LANs to 802.11a, a newer and faster technology that differs even more from Bluetooth.

Many analysts regard Bluetooth primarily as a technology for home users and for corporate users who are on the road, and 802.11b as more appropriate for workgroups and larger IT applications. Bluetooth works best at about 10 meters, they said, while 802.11b networks can support wireless connections of up to about 100 meters.

At the conference here, for example, Ericsson officials detailed a potential Bluetooth application that would let travelers connect to the Internet from their hotel rooms via a cell phone equipped with a wireless link to a laptop.

Newton, Mass.-based Cahners In-Stat Group estimates that about 650,000 mobile phones and 300,000 other types of handheld devices will be equipped with Bluetooth by 2005. But the technology has gotten off to a slow start because of development delays.

Ericsson was the first vendor to promise a Bluetooth-based device, announcing nearly two years ago a wireless headset that's supposed to work with cell phones. But Ericsson and Bluetooth backers didn't anticipate the amount of interoperability testing needed between devices, Bryan said.

Another problem is that chips required to support Bluetooth have been too expensive. Ericsson officials said that it now costs $15 to $25 to enable a cell phone or laptop with Bluetooth hardware but that the cost needs to be about $5 for the technology to catch on.

Gil Nolan, a senior hardware engineer at Doble Engineering Co. in Watertown, Mass., said Bluetooth could potentially be used on power-plant circuit breakers to signal service interruptions. Then, he explained, a short-range wireless device based on Bluetooth could send notices about problems to nearby relay devices. ◗

Long in the Bluetooth

Information disclosed about Bluetooth at this month's Embedded Systems Conference included the following:

- ▶ The technology "is about a year late to market," partly because of interoperability testing needs, according to Ericsson official Skip Bryan.
- ▶ Ericsson and Intel Corp. have probably spent more money on Bluetooth-related development work than any of the other vendors backing the technology, according to analysts.
- ▶ To allow Bluetooth and 802.11b wireless LAN software to work side by side on a laptop, developers will have to include protections that prevent the two technologies from canceling each other's radio signals.

Users Credit Indus With Changing

Say applications vendor more customer-friendly under new management

BY MARC L. SONGINI
ORLANDO

Some attendees at Indus International Inc.'s annual user conference here last week said the struggling vendor of asset management applications has changed the way it operates and become more customer-friendly during the past year.

Despite seven straight quarterly losses and the lingering specter of financial misdeeds allegedly committed by the company's former CEO, users and analysts said Atlanta-based Indus has been making strides toward a turnaround.

"We have seen a drastic change," said Steve Thomas, president of the Indus International User Group. Users "were very frustrated" under the previous management team, which was replaced early last year following a restatement of revenue in 1999, he said.

But, Thomas added, new CEO Kent Hudson has been more willing to support special interest groups and respond to user requests related to the company's software. Indus also recently established a process through which customers can petition for functionality upgrades, Thomas said.

The Securities and Exchange Commission (SEC) this month sued former CEO William Grabske and two other former Indus executives over alleged fraudulent accounting activities two years ago. But Indus recently settled claims filed against it by the SEC, and attendees here said those issues are now history.

Dave Taylor, enterprise resource planning manager at Boise-based Idaho Power Co., said that Indus' prior financial woes "are in the past and not relevant to anyone."

Taylor said that he had previously feared that Indus' products would suffer because of the problems but that the PassPort application used by Idaho Power has continued to evolve at a good pace.

The problems that had been plaguing Indus are "water over the dam now," said Houghton Leroy, an analyst at ARC Advisory Group Inc. in Dedham, Mass.

While Indus reported a $6.7 million loss in this year's second quarter, the company almost broke even on an operating basis.

As part of its comeback effort, Indus last week announced the rollout of new Web-based collaborative software that's designed to complement PassPort and Enterprise MPAC, its other flagship asset-management application.

Indus said the new product, as yet unnamed, will be able to handle collaborative e-commerce functions, particularly for midsize companies. Due out in next year's first quarter, the software will include role-based Web portals and built-in workflow processes. ◗

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BRIEFS

Bristlecone and IDS Scheer Cancel Deal

German software vendor IDS Scheer AG and Santa Clara, Calif.-based Bristlecone Inc. called off a June deal under which IDS Scheer planned to buy Bristlecone's consulting unit, which installs supply chain management systems based on software from SAP AG. The companies said the required business integration would have been "difficult and costly."

Qwest Lowers Outlook, Plans Cuts

Telecommunications and broadband service provider Qwest Communications International Inc. lowered its revenue and earnings forecast for the rest of this year and early 2002. Revenue is now expected to total about $20.5 billion this year, down as much as $1 billion from earlier expectations. As a result, the Denver-based company said it plans to cut 4,000 of its 66,000 jobs.

Intel, Via Battle Over Patent Infringement

Intel Corp. and Taiwan-based semiconductor maker Via Technologies Inc. locked horns in a legal battle, filing dueling patent-infringement lawsuits against each other. Intel accused Via of violating five U.S. patents related to the Pentium 4 microprocessor. Via responded by charging that the Pentium 4 and a companion chip set infringe on patents that it holds.

Cisco, Verizon Team On Home Networking

Cisco Systems Inc. and New York-based Verizon Communications said they're teaming up to market equipment and services to Fortune 1,000 companies that want their employees to have the same network access capabilities at home that they do in the office.

EMC Keeps Focus on High-end Symmetrix

Revamped product line doubles raw storage capacity of earlier models

BY LUCAS MEARIAN

DATA STORAGE market leader EMC Corp. last week announced three new Symmetrix disk arrays, saying they offer users twice the raw storage capacity and 16 times the number of mainframe Escon connections supported by the company's existing devices.

EMC said the new arrays will also support Fibre Channel connections for IBM mainframes. That matches a plan detailed in late July by IBM, which is due this month to begin shipping a Fibre Channel link that will directly connect its mainframes to the same storage-area networks used by Unix and Windows servers.

The new Symmetrix models — the 8830, 8530 and 8230 — are aimed at what EMC described as "hyperconsolidation" uses, in which islands of direct-attached storage are combined within a single RAID device. The top-of-the-line 8830 can hold up to 69.5TB of data and support as many as 80 PowerPC processors, the Hopkinton, Mass.-based company said.

The new arrays offer a 22% reduction in total cost of ownership through simplified management and increased storage capacity in smaller footprints, EMC said. But it wouldn't disclose prices, other than to say they start at about $100,000 and can range up to several million dollars, depending on capacity, connectivity and other features.

In addition, EMC is offering to buy back storage equipment made by rival vendors in an attempt to entice users to purchase the new devices. That comes after two straight quarters of lower-than-expected sales by EMC, which has been hit hard by the slowdown in IT spending fueled by the slowing economy.

AT A GLANCE

This Year's Models

EMC's new disk arrays feature the following highlights:

SYMMETRIX 8830: EMC's highest-capacity array, supporting up to 69.5TB of data in a single 17.5-sq.-ft. cabinet.

SYMMETRIX 8530: Supports storage capacities of up to 17.4TB in a single-bay cabinet measuring 6 sq. ft.

SYMMETRIX 8230: A low-end array supporting up to 3.5TB of data in a cabinet measuring less than 2 sq. ft.

When economic conditions improve, "there will be a significant backlog in data storage needs," said Joseph Tucci, EMC's president and CEO. To try to minimize that backlog, he added, EMC "will buy back some of these isolated islands and sell you a Symmetrix system in return."

John Webster, an analyst at market research firm Illuminata Inc. in Nashua, N.H., said one of the most significant features in the new Symmetrix arrays is their ability to partition data storage caches into 16 distinct parallel channels.

"For years, EMC has been saying a big monolithic cache solves all problems," Webster said. "[Now], it said cache is becoming something of a bottleneck."

The three arrays are all available immediately. EMC also announced a new version of its Enginuity operating software and a series of mainframe-related functionality additions, including the native Fibre Channel connection between the Symmetrix devices and IBM's mainframes.

Tucci said that within the next two months, EMC plans to make new product announcements concerning its midrange Clariion disk arrays and detail new software related to automated storage management.

Meanwhile, rival Hitachi Data Systems in Santa Clara, Calif., last week announced plans to release a 2G bit/sec. Fibre Channel link for its high-end Lightning 9900 disk arrays next month and add native mainframe Fibre Channel support early next year. ◗

Lernout & Hauspie Tries Again With Bankruptcy Plan

BY PAUL MELLER

Embattled software vendor Lernout & Hauspie Speech Products NV (L&H) last week filed a new restructuring plan with a bankruptcy court in Belgium and said it's talking with two potential financial backers.

The new plan would require $20 million to $25 million in cash and would let the Belgium-based company retain 400 employees, said L&H CEO Philippe Bodson. A proposal that was rejected by the Belgian court in June called for a budget of $100 million.

L&H is aiming to create a new company out of its flagship speech-recognition and language technology divisions. The same plan was filed in U.S. Bankruptcy Court in New Jersey late last month, along with a separate restructuring proposal for L&H's U.S.-based Dictaphone Corp. division.

If the two bankruptcy courts give their approval, Bodson said, a consortium of five Belgian and German banks that together are owed $340 million by L&H would receive 65% of Dictaphone's stock, and the new L&H would be fully owned by creditors.

L&H has been operating under Chapter 11 bankruptcy protection in the U.S. since last November, following a business free fall that began after questions were raised about its sales in Asia. Those questions led to an investigation by the U.S. Securities and Exchange Commission.

Bodson last week declined to name the two potential backers that have expressed interest in L&H's technologies. If a firm commitment isn't received by the end of this month, he added, L&H will pursue a liquidation. ◗

Meller is a reporter for the IDG News Service.

A Year of Trouble

Key events at Lernout & Hauspie include the following:

SEPTEMBER 2000	NOVEMBER 2000	JANUARY 2001	JUNE 2001	SEPTEMBER 2001
SEC begins investigating L&H's accounting practices.	L&H seeks bankruptcy protection in the U.S., says results dating back to 1998 will be restated.	Belgian court grants company temporary bankruptcy protection.	Company's first restructuring plan rejected by Belgian court.	L&H files new plan with the court.

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PATRICIA KEEFE

Lending a Hand

A DAY OF DARKNESS. So much has happened, and so much has already been said. So many people lost, and so many stories to tell. You can never imagine being touched by a tragedy of this scope, and yet we all were.

PATRICIA KEEFE is news director at *Computerworld.* You can contact her at patricia_keefe@computerworld.com.

My cousin's children visited the World Trade Center last Tuesday, the same day my brother-in-law sat down to a meeting in the Pentagon, the same morning that my former next-door neighbor switched his Delta flight to American Flight 11, heading from Boston to Los Angeles.

The cousins missed the bombing. Incredibly, my brother-in-law walked out of the Pentagon despite working several hundred feet from the blast site. Sadly, my former neighbor was killed when his hijacked plane plowed into the World Trade Center.

In the middle of it all, my anxious father called work, convinced that I had told him I was flying to Los Angeles last week. He said he just wanted to hear my voice. And so it was with my co-workers and, I'm sure, many of our readers, all racing madly to send e-mail and call friends and family in New York and Washington.

Initial attempts met with jammed airwaves, downed landlines and agonizingly slow Internet connections. But not for long. For the most part, our communications infrastructure withstood this assault of fear and grief.

The Internet ground on. ATMs continued to spit out money on request to New Yorkers, even in the midst of the city's chaos. Airline reservation systems went into overdrive as the skies were emptied. Our national defense systems remained up and running.

If last week's terrorist attacks were meant to bring this country to a standstill, they failed. And yet our reporting has revealed that there is concern at the highest levels in our government that we were *not* as prepared as we had hoped.

In the aftermath of this national nightmare, we all have a driving need to do something, anything, to help. It's been heartwarming to see the outpouring of offers in this dire time of need (see story, Page One). Companies donated huge sums. But we have some additional suggestions specifically for the IT community:

■ **Donate IT equipment or expertise.** After realizing the extent to which IT and high-tech organizations wanted to help but had no clearinghouse for their offers, we created a database of organizations and companies offering assistance. You can log on to our home page *(www.computerworld.com)* to register your information for our volunteer IT program. Once the dust settles and the rubble is cleared away, we will be left with businesses struggling to put the pieces back together again. There needs to be a well-documented and publicized method to offer such IT-oriented aid in the future.

■ **Shore up our technical infrastructure.** It's imperative that we take quick, concrete steps to strengthen our IT infrastructure even further. Terrorists are primarily interested in high body counts and gory video, but the ripple effect underscores the need to protect our technical underpinnings.

Multiple government groups are working on this from a variety of angles, and in many cases, they need the assistance and active participation of the business community. Our reporters have found that companies have been reluctant to join in because they don't want to reveal weaknesses. We have to get past this and realize the real value in such participation.

Among the issues to study: How do we create an even better generation of self-healing technologies? How do we manage a coordinated, multipronged attack in the physical world that has a ripple effect in cyberspace? The most efficient way to kill communications infrastructures is to blow them up. Just taking out four of the 13 major Internet nodes around the U.S. would have meant *real* problems for the military and the national economy as a whole. How do we prevent this?

However you choose to help, we salute your efforts and stand by to help *you* in any way we can. ◗

The staff of **Computerworld** *extends its heartfelt sympathy to the families and friends of the victims of last week's terrorist attacks. In the aftermath of this painful episode, we have been honored to witness and write about the outpouring of help from the IT community.*

PIMM FOX

HP's Bold Gambit: Good News for Customers

THE NEGATIVITY surrounding Hewlett-Packard's $20 billion bid for Compaq is so heavy you'd think HP CEO Carly Fiorina revoked everyone's right to watch *The Sopranos.*

Instead, in a gutsy, complex, time-consuming, hazard-prone feat, Fiorina has set in motion an event that acknowledges the sea change in IT.

Customers demand better value from vendors for hardware, software and services. They seek vendors that speak with one voice and have the longevity to see IT projects completed. This takeover satisfies these requirements and lets customers extract great service deals as both companies try to hang on to accounts.

PIMM FOX is *Computerworld*'s West Coast bureau chief. Contact him at pimm_fox@computerworld.com.

Of course, tech-land is rife with tales of woe.

PC sales are lousy, IT spending is under scrutiny for ROI, and margins are slashed to move products from bloated inventories.

This too shall pass.

Businesses will upgrade and Web-enable legacy systems. Internet usage will increase as new products and peripherals for imaging, printing and mobile computing make inroads into IT infrastructure. Service and maintenance will remain essential as enterprises outsource IT functions and integrate applications for efficient operations.

But pity the poor purring pundits, to whom HP is an IT has-been, misguided in its purchase of a white elephant burdened with the pedigree of Digital and Tandem.

Many claim that the execution of the deal is doomed to fail.

But suppose these people — who failed to predict the Internet meltdown — are wrong.

The new HP, with $87 billion in revenue, will be second to IBM. That's a big club to wield with suppliers such as Intel and AMD. The new HP will be No. 1 in Intel-based servers, imaging and access devices and will control two-thirds of retail PC sales. Compaq addresses HP's weakness where Dell has made headway: in corporate PCs and mid- to high-end servers.

Quick Link For more *Computerworld* columnists and links to archives of previous columns, head to: **www.computerworld.com/q?q1000**

Michael Dell may woo Compaq customers, but his price war will come back to bite him in the motherboard. Prices for chips, chip sets, memory chips and disk drives will fall.

HP's experience in outsourcing aids Compaq, while cuts in redundant product lines, personnel and operations will save $2.5 billion by 2004, says Carl Howe of Forrester Research. Some lament HP's PC dependence, but in truth, the company will host systems ranging from HP 3000 servers to Compaq's OpenVMS. These systems need service. And with Compaq, HP will have 65,000 service professionals to upsell higher-margin products and juicy consultant and maintenance contracts. HP gets Compaq's storage operations, the iPaq Pocket PC and a platform business.

Fiorina is doing what others are afraid of: securing a competitive future that lowers costs for customers. ◗

DAVID MOSCHELLA

DOJ Decision Proves That System Works

As THOSE Accenture airport ads proclaim, "Now it gets interesting." The Justice Department's decision not to seek the breakup of Microsoft and to no longer pursue charges of illegal "tying" makes it possible to resolve a case that otherwise would likely have dragged on indefinitely. Either by judicial decision or mutual settlement, the end may finally be coming into view.

DAVID MOSCHELLA is vice president of knowledge strategy at Boston-based MeansBusiness, an online database of business ideas. Contact him at **dmoschella@earthlink.net**.

Those who argue that the DOJ's Sept. 6 announcement represents a politically or philosophically inspired retreat are being prematurely dismissive. The reality is the department had little choice on these two issues, and we won't know the Bush administration's real attitude toward the case until after we've seen the proposed remedies (which were due to be submitted before the U.S. District Court last week in advance of Friday's initial hearing). I expect the proposals to be aggressive.

Anyone who bothered to read the U.S. Court of Appeals ruling of June 28 should concur with what the DOJ has done. The court couldn't have been clearer in its view that it didn't think a breakup was either warranted or justified. Similarly, the court basically said the DOJ botched its efforts to prove illegal tying. It then added that the DOJ could push the issue again but warned that existing precedents, plus the fact that so many other firms bundle software products, would make pursuing its case a steep uphill climb.

The DOJ chose to go forward in those areas where it has the appeals court's clear support. Because the court berated Judge Thomas Penfield Jackson's behavior and overturned some of his rulings, it's easy to overlook the fact that the court unanimously agreed that Microsoft repeatedly engaged in illegal anticompetitive conduct in its dealings with PC vendors, Intel, Sun Microsystems, Apple and Internet service providers. This says that the court will likely give District Judge Colleen Kollar-Kotelly broad discretion in determining the appropriate conduct remedies.

By now, the list of likely remedies has become pretty familiar. It includes standard and published Windows pricing, the ability of PC vendors to freely configure their software offerings, Windows source code availability, the elimination of forced or exclusionary conditions, the continued availability of older operating system versions, onsite government oversight and, possibly, specific procedures aimed at Windows XP. Taken together, these aren't tokens or minor slaps on the wrist.

When the case began in 1997, few thought the government would ever get so close to winning these types of major concessions. The idea of a breakup was then a remote possibility, so it shouldn't be the standard by which the results of this case are now measured. The reality is that John Ashcroft's Justice Department and the attorneys general for the states involved in the case have a historic opportunity to improve the software industry's competitive playing field. Were they to back off now, history would judge them harshly.

This case has had so many twists and turns that predictions are clearly dangerous. Jackson's sharp disapproval of Bill Gates and the company wound up helping Microsoft. But the appeals court, while sharply rebuking Jackson, also validated the government's core charge. Now the DOJ's seeming retreat actually puts it in a position to fight from solid, difficult-to-appeal ground.

This case has always been about Microsoft's conduct. That conduct has been deemed illegal, and now the courts must decide what to do about it. The system is working. ◗

READERS' LETTERS

Merger's Aftermath

THE BIGGEST concern I have about concentration in PC and server hardware providers is that it creates a moral hazard of collusion with the leading operating system vendor and the leading networking hardware and network operating system provider ["Desperation Deal," Page One, Sept. 10]. Compaq by itself has been a kingmaker in the PC business for nearly a generation. Imagine what HP/Compaq will be.

Todd Boyle, CPA
GL architect
GLdialtone.com
Kirkland, Wash.

COMPAQ IS still digesting the Tandem and (god-awful) Digital deals. So HP is actually buying three disjointed units. This will be difficult, if not impossible, to pull off. Carly Fiorina hasn't been able to manage HP alone, much less merge it with a series of other behemoths. Michael Dell and Lou Gerstner will drink champagne together next time they meet.

Andy Orrock
Director
Transaction Design Inc.
Corte Madera, Calif.

The Newest 'Law'

LET ME ADD one more law to Frank Hayes' list [" 'Laws' to Work By," The Back Page, Sept. 3]. **Sanders' Law:** You never save money buying computers. *Who said it:* Obscure government IT manager Rex Sanders. *What it means:* You should buy computers to do things faster, better, bigger, flashier. But you don't save money in the long run — usually because no one adds up all the costs. *What too many people think it means:* Another crazy idea. Of course we save money! *Why the difference matters:* Buying computers for the wrong reasons leads to trouble. *Amazing coincidence:* In the same issue, Paul A. Strassmann ["Diet? What Diet?"] proves with hard numbers what I've observed over 25 years.

Rex Sanders
San Carlos, Calif.

Train Federal Workers

WHY MAKE a problem so complex and difficult to resolve ["Feds Cast Bait to Lure IT Workers From Private Sector," News, Aug. 6]? Want to solve the "crisis"? Provide up-to-date technology training to government IT workers. This would be far less expensive than sending them on sabbaticals to private organizations.

Gary L. Skinner
Computer specialist
Yuma, Ariz.

Just Wait, Guy

VINCE TUESDAY'S Sept. 3 installment of Security Manager's Journal was a wonderful article ["Legal Insecurities Stymie Web Site Outsourcing Deal"]. I will be fascinated when this expert of many technical wonders adds managing a large outsourcing contract to his accomplishments. Hey, guy, if you think negotiating this contract is fun, wait until you attempt to operate under it.

Marshall J. Huntenburg
President and CEO
MJH Inc.
Somerset, N.J.

COMPUTERWORLD welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

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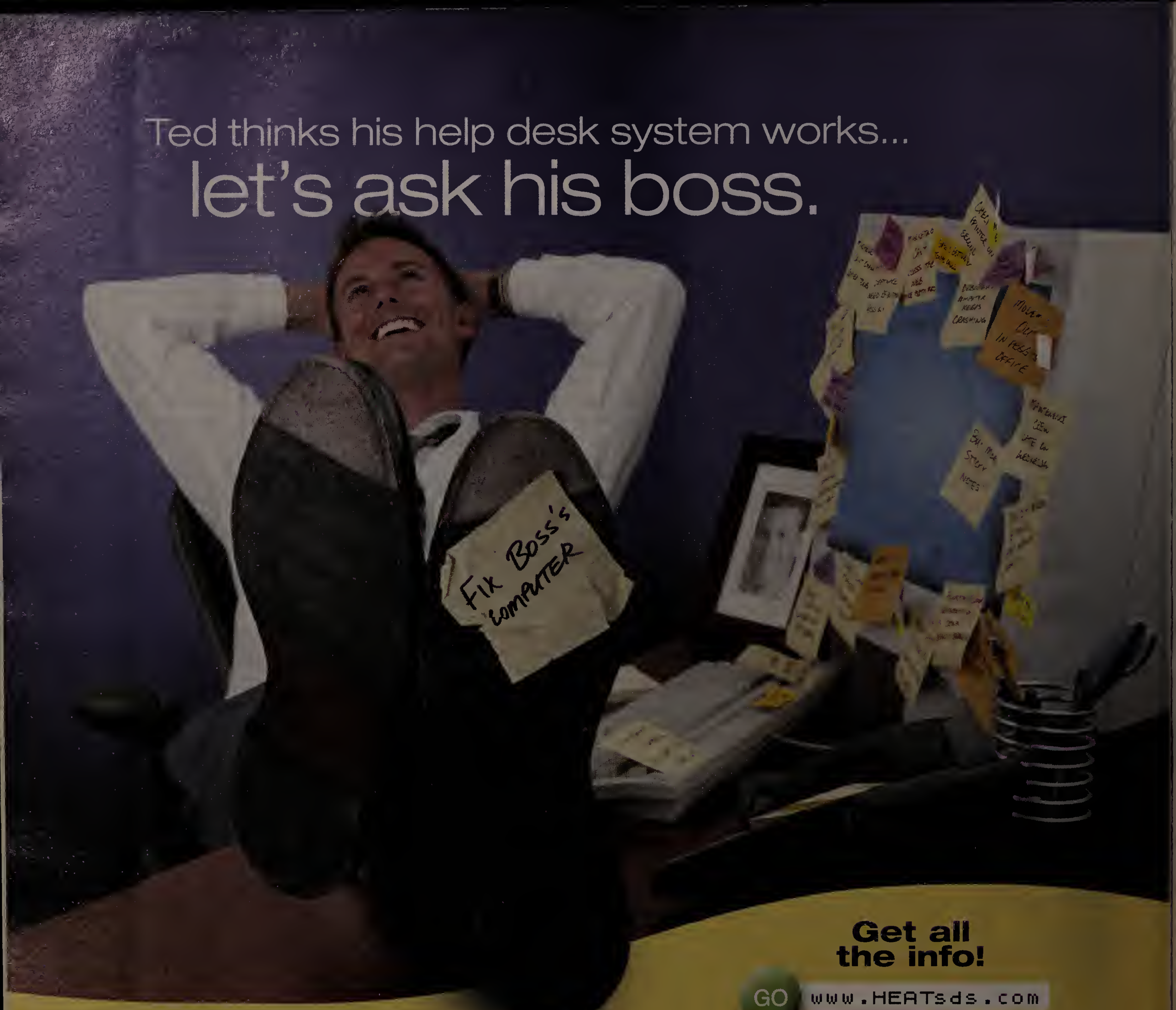
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KNOWLEDGE CENTER

Wireless Headaches

Brave IT managers are plunging ahead. But huge challenges remain, such as security, speed, reliability, standards, usability and development tools.

KATHERINE STREETER

EDITOR'S NOTE

Unwired Pioneers

POP QUIZ: Which came first, the wired LAN or the wireless LAN? Today, we tend to think of wireless LANs and wireless connections to the Internet as exotic, new applications, but a short visit to the archives shows that isn't true. In 1970, researchers at the University of Hawaii, led by Norman Abramson, demonstrated the first wireless LAN — a bidirectional, packet-switched radio network connecting computers throughout the Hawaiian Islands. The network, called Alohanet, was connected to Arpanet (the precursor to the Internet) in 1972.

SPECIAL REPORT
WIRELESS

Alohanet also attracted the attention of Xerox PARC researcher Bob Metcalfe, who was inspired to use some of the protocols when he developed the first experimental Ethernet LAN in late 1972.

So the wireless LAN not only predates the wired LAN (OK, just barely), but wireless connections to the Internet also qualify as ancient history. Of course, Ethernet LANs became a huge success, and wireless LANs lagged far behind — they're just now gaining widespread acceptance in corporate America.

My point is that, like two siblings separated at birth, the wireless and wired worlds are headed for a reunion after many years apart. While this all sounds very happy, the typical IT department confronts huge challenges in making it work: Wireless applications developers have only a hodgepodge of tools and no standards to guide them. Corporate secrets can be plucked out of the air. Wireless skills are scarce. And you never seem to get the "up to" speeds that are touted in the press releases.

The articles in this Knowledge Center package identify the barriers and show how IT managers are finding creative ways to overcome them. At *Computerworld.com*, we provide a huge array of additional stories, interviews, research and resources to help you reunite the wired and wireless worlds. And next week, our sister magazine *Computerworld ROI* identifies 25 wireless innovators.

Aloha. ◗

Mitch Betts is director of Computerworld's *Knowledge Centers. Contact him at mitch_betts@computerworld.com.*

ONLINE EXCLUSIVES

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In Search Of the Ki

Pioneers point to wireless LANs, mobile e-mail, field service programs and remote connectivity between factory-floor devices as the big winners so far. By Matt Hamblen

KATHERINE STREETER

YOU'VE HEARD all the worries. Will mobile commerce ever take off? Will we ever see meaningful location-based wireless services? Will the economic downturn hurt funding for wireless enterprise projects?

Despite these concerns, wireless devotees still abound, and many companies are carefully considering applications that run the gamut from messaging to wireless LANs.

In fact, IT managers at some companies are worried that some of their wireless projects are gaining too much momentum.

"We have to train top-line managers not to make drastic decisions on snapshot performance data" that they obtain via smart phones and handheld

Anders Hejlsberg

From: Anders Hejlsberg (Microsoft)
Sent: September 14, 2001, 2:51 PM
To: Developer & IT Professionals
Subject: Delivering .NET: Visual Studio .NET and the .NET Framework

Although unnamed at the time, Microsoft .NET began more than four years ago when we envisioned a common platform for building applications that could be delivered as reusable, interoperable services over the Internet.

Built around industry standard protocols, the internet proves ideal for scalable application deployment. Unfortunately, current distributed application methodologies, such as DCOM, CORBA, or RMI, do not scale to the Web. They may work well in homogeneous environments but do not enable true integration across different systems and are difficult to deploy and maintain.

Through our extensive work with the standardization of XML and SOAP, we realized how applications would be built in the future to enable true integration across the Web. The result is Microsoft .NET, Microsoft's platform for XML Web services. A new agile application architecture, Microsoft .NET was designed from the ground up to leverage the distributed nature of the Internet.

Core to .NET is a new toolset & architecture—one in which developers are free to mix and match new and existing components while leveraging the diversity of programming languages and tools developers use today. Enter Visual Studio .NET and the .NET Framework.

Together, this toolset and architecture enable the next generation of XML Web services and applications and dramatically simplify application development. Visual Studio .NET and the .NET Framework are designed with deep integration of Internet standards and protocols, such as XML and SOAP. The .NET Framework automatically takes care of much of the underlying infrastructure, allowing developers to focus on writing the business logic code specific to their applications. For example, the .NET Framework:

- Provides a common set of application programming interfaces (APIs) and a unified set of classes and components across all popular programming languages.
- Removes the complicated aspects of COM, such as reference counting and registering components.
- Includes dozens of components that encapsulate common tasks, such as building a shopping cart with ASP .NET.
- Enables you to build and expose the same business logic code as either an XML Web service, an HTML page, or, using the Microsoft Internet Toolkit, as a page that is automatically formatted for a variety of mobile devices.

The .NET Framework guides you along a path of creating applications with a stateless, loosely connected programming model, which is what characterizes the Web.

With support for more than 20 programming languages, Visual Studio .NET and the .NET Framework enable developers to leverage their existing skills to build new XML Web services and applications. Widely popular, Visual Basic is now a first-class, object-oriented programming language that includes features such as implementation inheritance, structured exception handling, and free-threading. In addition, we've created a new language, C#, as the first component-oriented programming language in the C and C++ family to combine the power of these languages with the functional ease of modern, rapid application development tools.

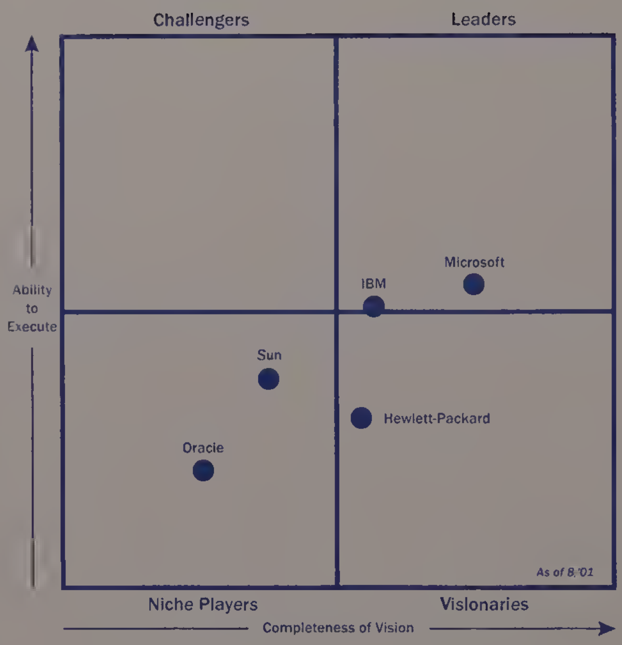
In June 2001, we reached a major milestone by delivering Beta 2 of Visual Studio .NET and the .NET Framework. They provide the foundation for Microsoft .NET, a platform that fully enables XML Web services, and we expect them to have an even greater impact on technology than Visual Basic 1.0 had 10 years ago.

We are on the final approach to shipping Visual Studio .NET, and I am very excited by the number of customers, partners, and Microsoft services that have already deployed solutions on the .NET platform. Leading-edge IT organizations like Dollar Rent-A-Car, Continental Airlines, Zagat Survey, and others, are using the .NET platform today to deploy XML Web services. As we move forward, more and more products from Microsoft and its partners will support the vision of making the Internet programmable through any kind of device—and you'll see more and more XML Web services in use. I hope you are as excited as I am to get these new tools and to start building your next generation of applications with .NET.

Anders Hejlsberg

Anders Hejlsberg
Microsoft Distinguished Engineer and chief architect of C#

From Babel to Babylon. The single largest problem facing your organization is integration. How are you going to handle it? You are looking at a new business relationship, but your business partner is using software with which you can't integrate. You just acquired a new company, and their software can't talk to your software. Even your existing applications don't talk to each other. This is the situation in IT today. Tomorrow, everything will be different.



Source: Gartner, "Web Services Major Vendors," D. Smith, August 2001*

A deceptively simple standard, Extensible Markup Language (XML), is turning the way we build and use software inside out. XML Web services are a component model for application development—a model that assumes integration is a central part of the development process. Coupled with technologies introduced by the Internet, XML is demolishing the integration Tower of Babel, and creating a Babylon of XML Web services. With the availability of XML Web services, companies now have the opportunity to transform the Internet into a true platform for integrating and delivering their core business value.

Widespread support within the developer community and throughout the computing industry around standards such as XML and HTTP ensures that XML Web services will allow all businesses to accelerate and deepen the level of interaction with their consumers, their employees, and other businesses.

XML Web Services: Building the Universal Protocol
The XML Web services architecture is founded on the principles of connection, communication, description, and discovery.

1. A common language is needed to **connect** and share information with others. XML is *the* universal data format that makes connection possible by providing a standard format for data exchange that does not require your business partners or customers to use a particular programming language, application, or operating system to interact with your systems.
2. Simple Object Access Protocol (SOAP), the new World Wide Web Consortium (W3C) XML Protocol for exchanging data, enables systems to **communicate** and make requests—for example, to call a service, schedule an appointment, order a part, or deliver information—through a common protocol.
3. Additionally, you need to **describe** the functions an XML Web service performs. Web Service Description Language (WSDL) is a standard format in which a service can publish the names of functions, the parameters that are required, and the results returned from any XML Web service.
4. Finally, businesses need a way to **discover** services on the Internet for consumption. Universal Description, Discovery, and Integration (UDDI) is a broad industry effort to make it easy to locate and understand other companies' XML Web services. Think of UDDI as a kind of "yellow pages" directory of XML Web services. (http://uddi.microsoft.com)

Together, these principles enable you to deliver XML Web services across the Internet or an intranet regardless of the programming language, computing device, or object model you use. As long as the fundamental communication occurs through XML Web services, different systems can remain independent from each other. For example, a Microsoft® Windows®-based application can interact directly with an XML Web service running on a UNIX server, and can do so without expensive and proprietary integration technologies.

> "This is the way development is supposed to be: the environment helps you every way that's appropriate, but otherwise stays out of your way. If you develop on a Windows machine, you're probably going to want to use Visual Studio .NET."
>
> —*Martin Heller,* BYTE

Microsoft .NET: Visual Studio .NET and the .NET Framework
Microsoft .NET is Microsoft's platform for XML Web services. Today, Microsoft is focusing the .NET platform on five areas: clients, servers, XML Web services, user experiences, and tools. Microsoft is building software in all these areas, ranging from Windows XP and Windows .NET Server to a suite of building-block services that manage your calendar or list of favorites. The products and services within Microsoft .NET will interoperate with a broad set of XML-based products across vendors.

> "From our partners' perspective, accessing our content via Web services will be far easier than what they've had to go through in the past. They will no longer need to build the infrastructure to import, store, and manage it. When combined with our new flexibility in licensing options, this means we'll have a far more attractive package to offer to prospective partners."
>
> *—Stephen Forte, CTO, Zagat Survey*

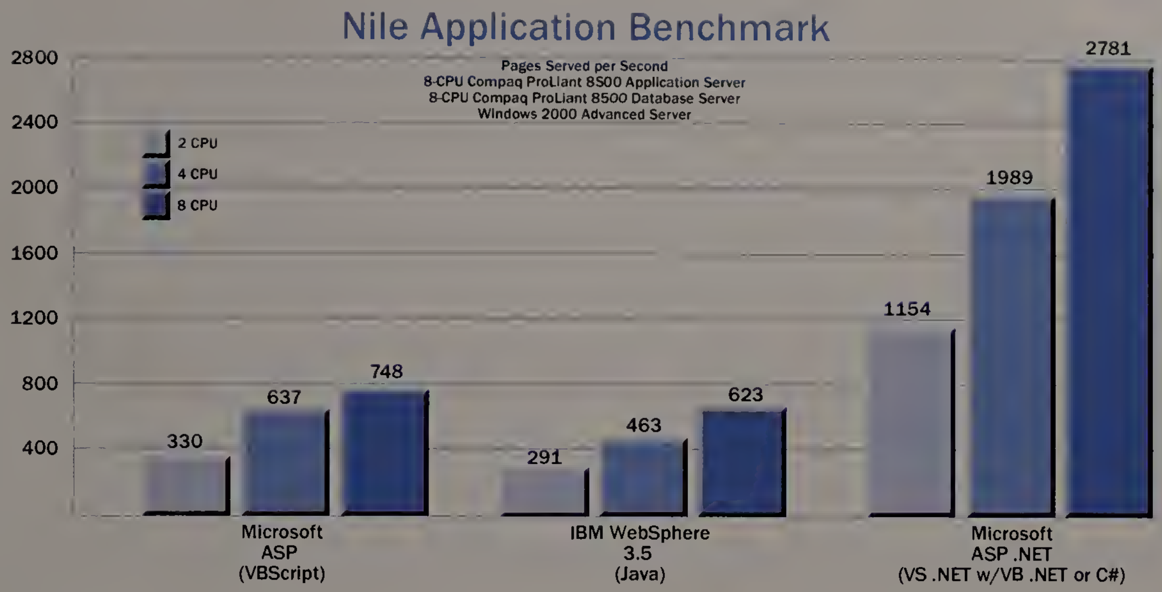
Making the .NET vision a reality requires both an agile architecture and a set of highly productive development tools. In Microsoft .NET, Microsoft delivers both of these elements.

The Microsoft .NET Framework is Microsoft's programming model for building and working with XML Web services. Built from the ground up for the loosely coupled Web environment, the .NET Framework provides an agile, productive, scalable environment for integrating existing applications with next-generation XML Web services.

Microsoft Visual Studio® .NET, a development tool designed for XML Web services, exploits the capabilities of the .NET Framework by providing the most productive system for building all kinds of applications, from simple single-tier applications for Windows to client/server applications to *n*-tier applications composed of XML Web services.

XML Web Services: The Agile Application Architecture
XML Web services provide a simple, flexible, standards-based model for integrating applications. Developers can easily assemble new applications from existing and new code, regardless of the platform, development language, or object model used to implement any of the constituent services or applications. This development

> "...transforming a COBOL developer into a professional Java developer will cost an enterprise approximately $57,000 in expenses and losses, an amount equal to almost 90 percent of a COBOL developer's salary."
>
> *Gartner, "The Cost of Migrating COBOL Developers to Java," J. Feiman, R. Flatau-Reynoso, September 2000*



Microsoft .NET tops IBM's best result by over 300 percent. .NET is significantly faster and more scalable than WebSphere 3.5 Enterprise Edition. It also bests ASP/COM+ in performance. The Nile Application Benchmark is a Doculabs/Ziff Davis e-commerce benchmark that represents a complete end-to-end e-commerce application with realistic, heavy user loads placed on the system.

All results based on Windows 2000 Advanced Server. IBM WebSphere 3.5 Enterprise Edition running on Oracle 8i database. Microsoft ASP and Microsoft ASP .NET running on SQL Server 2000 database.

framework translates into business agility by making it simple to integrate within your company and to link with business partners.

Visual Studio .NET, coupled with the .NET Framework, is the only environment today built from the ground up for XML Web services. The .NET Framework's support for XML Web services is complete—from internal data types that map to SOAP, the core standard for XML Web services, to innate features in ASP .NET that make creating an XML Web service a matter of one line of code. Microsoft's next-generation Windows Server product line, Windows .NET Server, expands the XML Web services capabilities by including features such as Passport/Active Directory™ integration.

Guarantee the "abilities." The "abilities"—reliability, scalability, deployability, and so on—are all about the operational aspects of applications. The .NET Framework extends the core capabilities in Windows Server, making it faster, more reliable, and more secure than ever before. In fact, through improved caching and compilation, ASP .NET, the Web application environment in the .NET Framework, is three times faster than its competition. [See Nile Application Benchmark chart] Improvements to the process model mean that applications run more reliably, delivering 100 percent perceived uptime to the user. "No-touch" deployment features make application installation as easy as copying software onto the disk drives of client machines or to the servers in your data center, and new applications won't interfere with existing applications.

> "We were twice as productive [using the .NET Framework and Visual Studio .NET] as we were on the initial release of the solution."
>
> *—Tore Lode, Senior Developer, CyberWatcher Inc.*

Maximize developer productivity. Tying together XML Web services requires a new breed of application architecture and development tool. Today, Visual Studio developers lead their profession in writing high-performance applications. They are accustomed to having the most productive tools for building applications that use client- and server-side components. Visual Studio .NET moves these skills to the next generation by making it easy to build, use, and publish XML Web services. Visual Studio .NET provides the most comprehensive set of tools for building the broadest range of applications for a variety of user interfaces, including rich clients, browsers, and mobile devices.

> "Compared with similar projects in the past, we're measuring deployment time in hours instead of weeks."
>
> *—Ferdy Khater, Director of Application Development, Continental Airlines*

The key to the .NET developer experience is that it comes naturally to developers, with little or no retraining. For example, the .NET Framework makes it easy to build XML Web services in any programming language—from Microsoft Visual Basic® .NET, with its new object-oriented programming features, to Microsoft Visual C++® .NET, Perl, Java, COBOL, or RPG. The selection of a programming language becomes a personal choice. Companies can now draw on the entire pool of developers and are not limited to using a single programming language.

Tying the entire development process together, Visual Studio .NET provides features for enterprise development—including the design, testing, and deployment of the application, as well as coordination with other team members. Visual Studio .NET targets the entire development life cycle and is a powerful platform for third-party development solutions, providing access to a wide variety of developer tools in a consistent environment.

Visual Studio today is the most productive tool for developers. Visual Studio .NET unleashes the next generation of application development, marrying RAD, enterprise development, and XML Web services and applications.

SOLVING REAL BUSINESS PROBLEMS: ZAGAT CASE STUDY

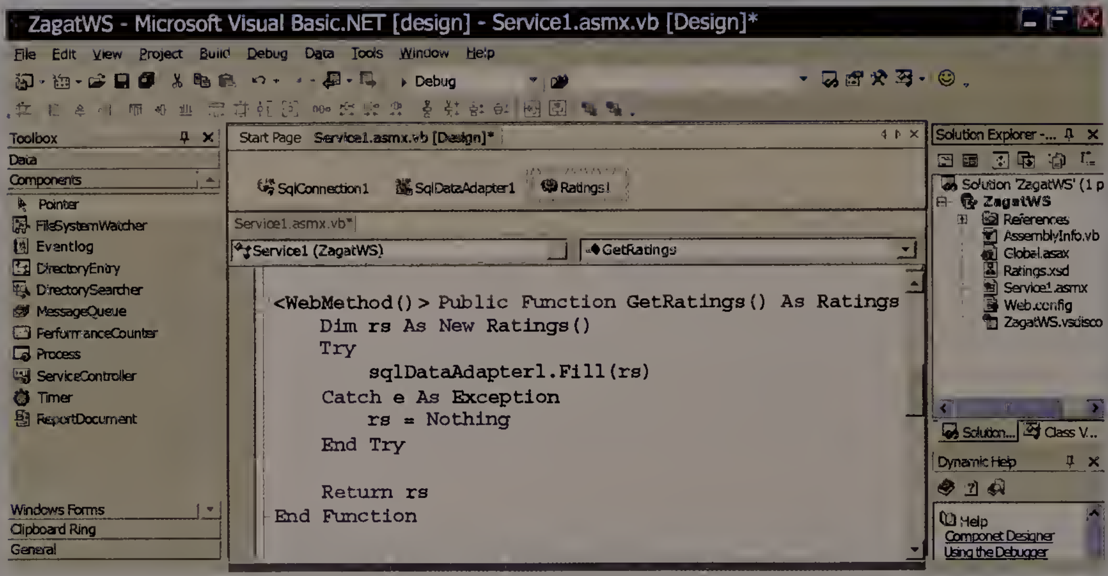
Zagat Survey, the premier provider of restaurant rating guides, was expanding their business to include travel and entertainment guides. They were publishing restaurant guides in over 45 cities worldwide, managing thousands of restaurant reviews, and bringing all of these features online. Zagat was using a set of nonintegrated utilities that required manual intervention to publish data to both the company's Web site and paper-based guides.

After evaluating several options, Zagat decided to leverage XML Web services and Visual Studio .NET to create an integrated solution for content management. Visual Studio .NET facilitated simple integration with their Web site and traditional book publishing systems, which enabled them to syndicate their restaurant ratings and reviews to third parties and find new business opportunities.

Using an XML Web service, Zagat can easily publish restaurant rating information to partners from a simple database query based on a restaurant name. Among other information, Zagat's restaurant review database tracks the restaurant's ratings on food, décor, and service. To illustrate an XML Web service, the following functional example shows how the restaurant rating information might be exposed. Note that the actual production system includes more features and has a richer security model.

Build an XML Web service. Visual Studio .NET includes a New Project wizard that enables developers to build an XML Web service with just a few mouse clicks. The following Visual Basic .NET code sample uses a simple SQL Select statement to return the rating information. [See Figure 1] The values are stored in the Ratings structure, which is automatically serialized to the XML Web service caller.

Continued on back



```
<WebMethod()> Public Function GetRatings() As Ratings
    Dim rs As New Ratings()
    Try
        sqlDataAdapter1.Fill(rs)
    Catch e As Exception
        rs = Nothing
    End Try

    Return rs
End Function
```

Figure 1. Building an XML Web service with Visual Studio .NET is as easy as adding the <WebMethod()> directive.

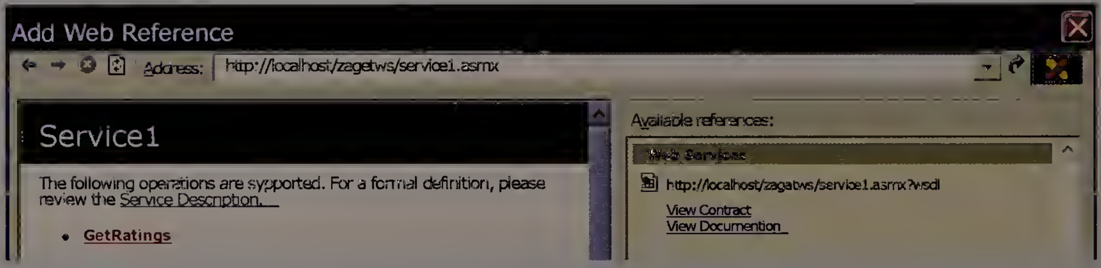
The important new **<WebMethod()>** directive is all that is needed to expose the **GetRatings** method as an XML Web service! The remaining code executes a simple database query and returns the results to a Ratings variable. The database connection is created by simply dragging the Ratings table onto the design surface of the page. In addition, notice the new *Try...Catch* syntax for handling errors and the *Return* keyword—powerful features introduced in Visual Basic .NET.

Test the XML Web service. In Visual Studio .NET, one command compiles the XML Web service and displays a test page that allows you to invoke the method from a Web page. The XML Web service returns the Rating information as XML and can now be invoked via SOAP or HTTP GET. The .NET Framework manages the incoming parameters, object invocation, and the XML serialization of the return value. [See Figure 2]

```
<?xml version="1.0" encoding="utf-8" ?>
-<Ratings xmlns="http://tempuri.org/">
-<diffgr:diffgram xmlns:msdata="urn:schemas-microsoft-com:xml-msdata"
   xmlns:diffgr="urn:schemas-microsoft-com:xml-diffgram-v1">
  -<Ratings xmlns=http://www.tempuri.org/Ratings.xsd>
   -<Ratings diffgr:id="Ratings1" msdata:rowOrder="0">
          <Restaurant>Coho Winery</Restaurant>
          <RestaurantID>1</RestaurantID>
          <Food>20</Food>
          <Decor>21</Decor>
          <Service>23</Service>
          <cost>26</cost>
      </Ratings>
    </Ratings>
  </diffgr:diffgram>
</Ratings>
```

Figure 2. Visual Studio .NET automatically generates the XML for your Web service. (Schema information omitted)

Use an XML Web service. Using and consuming XML Web services with Visual Studio .NET is just as easy as creating them. From a new Web Application project in Visual Studio .NET, you add a Web Reference to the service's URL, as shown. [See Figure 3]



Address: http://localhost/zagatws/service1.asmx

Service1

The following operations are supported. For a formal definition, please review the Service Description.

- GetRatings

http://localhost/zagatws/service1.asmx?wsdl

Figure 3. Consume an XML Web service using the Add Web Reference feature.

The XML Web service can now be utilized as if it were an object in your project, with the same powerful IntelliSense® statement completion, code colorization, and syntax checking that you have for local objects.

> "With Visual Studio .NET and the .NET Framework, we've been able to do more with less programming effort than we ever dreamed of—it's almost as if Microsoft knew the specifics of the application that we're developing. Our developers are at least twice as productive as they were before."
>
> *—Stephen Forte, CTO, Zagat Survey*

Get Started Now

1. Get Visual Studio .NET Beta 2 and the .NET Framework.
2. Create a pilot project to evaluate XML Web services, and publish it on the Internet. Developers looking to deploy XML Web services will find a new Web Hosting tab on the Start page in Visual Studio .NET. The Web Hosting tab gives developers access to a list of Web hosters that provide free Web space to facilitate the live deployment of XML Web services.
3. Get training on how to create XML Web services and to use Visual Studio .NET.

A subscription to *MSDN® Universal* provides you with priority access to Visual Studio .NET and delivery of the resources, servers, and product updates you need to learn about Microsoft .NET.

Get Visual Studio .NET Beta 2 and start building XML Web services. Visit **microsoft.com/net** for more information.

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ler App

devices, says Frank Parachini, vice president of IT at Pegasus TransAir Inc. in Grapevine, Texas. One wireless application used by the logistics provider gives managers instant data about the on-time package delivery performance rates for each customer. Problem is, the rankings change several times a day and can be misleading.

"We train managers that having this wireless tool is like carrying a .357 Magnum, and they can make good use of it or shoot themselves. Except in our application, it's like we gave them a bazooka," Parachini says.

Still, wireless applications that let customers and employees track the status of their packages on different types of devices have helped Pegasus distance itself from its competitors.

"We got payback in three months, and our ongoing cost is almost nothing," says Parachini.

Whither M-Commerce?

While wireless applications used to dispatch information to field service technicians or connect embedded factory machines to one another have caught on big, mobile commerce, in which consumers use wireless devices to obtain product information or make purchases, has dropped off. Still, analysts say it's premature to sound the death knell for m-commerce.

"M-commerce, to banks and airlines, still makes sense because their customers see time as critically important, and airlines lose revenue if they don't sell seats," notes Ken Dulaney, an analyst at Gartner Inc. in Stamford, Conn.

By contrast, BestBuy.com began zapping product information to customers with wireless devices about a year ago but slowed the process this past spring, around the time competitor Amazon.com Inc. began pulling back on its own wireless purchasing strategy.

"We don't see the consumer demand for m-commerce the way we anticipated, and we're continuing to watch this in a year of economic challenges," explains Mark Ebel, director of new business development at BestBuy.com, a division of Best Buy Co. in Eden Prairie, Minn.

At Citigroup Inc. in New York, efforts are still under way to test or deploy wireless systems that can notify customers about transactions and send investment alerts. But because wireless is an emerging technology, the financial services giant has been "judicious" in its rollouts, says spokeswoman Nina Das.

Dulaney says the delays and misstarts on some corporate wireless projects during the past year obscure the fact that many of these efforts began in earnest as long as five years ago. The projects with the biggest paybacks have been "unsexy" and industry-related, in field service or factory settings, he says.

SPECIAL REPORT
WIRELESS

By contrast, consumers have given dismal responses to more recent applications such as the Wireless Application Protocol (WAP) running the much-hyped wireless Web, thanks in part to the hassle of navigating small screens.

"WAP access has been a miserable experience, and *wireless Web* is an oxymoron, just like *jumbo shrimp*, which is really just a disappointment when you get it on your plate," says William Crawford, an analyst at U.S. Bancorp Piper Jaffray Inc. in New York.

Instead, most of the corporate interest surrounding wireless fits in three areas: messaging (which includes field service applications), wireless LANs and wireless embedded devices.

"For now, messaging is the killer application," given the widespread interest in it from a variety of business categories, Crawford says.

One of the pioneering applications reflects just how valuable wireless field service programs can be. In 1997, Sears Roebuck and Co. spent $40 million to arm its 12,500 field service technicians nationwide with LAN-connected laptops and saw a return on investment within one year, company officials say.

Using the application, technicians download the next day's service orders along with software updates to ruggedized laptops via wireline overnight. They then use a variety of wireless data networks to receive real-time updates on arrival, departure and parts information on the scheduled day of service, according to William P. Miller, program manager at the Hoffman Estates, Ill.-based retailer.

Since the initiative was launched, the number of phone calls placed by Sears field technicians has dropped by 75%, saving the company $7 million over three years, Miller says.

Another field service trailblazer is Oxford Properties Group Inc. in Toronto, which manages 30 million square feet of office space in North America. Last year, Oxford's 600 service personnel began carrying Research In Motion Ltd. BlackBerry handhelds that are connected to a central call center. When a tenant calls for service, the call center agent types up a report that is routed to the appropriate technician, says Steven Smith, vice president of the project.

By using e-mail this way, Oxford has been able to cut its call center staff from 30 people to 20 and save on cellular phone use. "It was such a good idea when we first heard about it that we just wanted to do it, and without question it was the right thing," Smith says.

LAN Shark

Starbucks Coffee Co. is providing wireless LANs for patrons of its New York shops and will soon make the technology available to the caffeinated denizens of its stores nationwide.

Customers can order coffee and use a wireless modem over a fast network to browse the Web or download e-mail. The system relies on 802.11b wireless LANs, similar to those installed in many workgroup settings, giving users the ability to download data at a rate of 11M bit/sec. within 300 feet of a wireless hub, analysts say.

Quick Link

ONLINE EXCLUSIVES

- As companies plot out wireless projects, they often forget to focus on return on investment and cost-control measurements:

www.computerworld.com/q?22748

- IBM consultants say wireless LANs are the hot wireless technology in corporate America – and security isn't a showstopper:

www.computerworld.com/q?22992

"Some people think wiring up Starbucks [with an 802.11b wireless LAN] is a flaky idea, but it means that a sales guy after a meeting can make a stop and download significant amounts of data in a short time," says Dean Douglas, general manager of wireless at IBM, which is providing wireless LAN technology for the project.

Analysts say the payback from 802.11b networks often occurs in less than a year, thanks to improved efficiencies and savings resulting from the fact that users don't have to spend as much money installing cable.

Ford Motor Co. sees the potential of these networks, too. In 1998, the Dearborn, Mich.-based automotive giant began installing a wireless call system in 20 plants that assemblers can use to notify the parts department when they need more fenders or mufflers. Although the radio system from Santa Clara, Calif.-based WhereNet Corp. had to be tested to ensure that it didn't interfere with 802.11b networks (it didn't), the system can be installed for about half of what a wired system costs and takes about one-fourth as long to deploy, says Mark Wrubel, a project engineer at Ford.

Analysts also see industry interest in machines that talk to one another over wireless networks, although such devices aren't expected to become mainstream for some time.

For instance, Farmington, Conn.-based Carrier Corp. now offers air conditioners that report machine functions using wireless connections — a potential boon for property managers.

Beyond that, analysts expect that wireless notifications of machine functions from car engines, computers and other electronic devices should become commonplace within five to 10 years. ▸

Unfulfilled Promises

Wireless LANs are great — as far as they go. And today's wireless carrier networks lack the speed and reliability corporate applications require. By Robert L. Mitchell and Russell Kay

IF YOU THINK there's anything simple about wireless networking, think again. There are plenty of carriers and standards, and a fair degree of hardware interoperability. However, you can get either usable speed or wide coverage, but not both. Wireless LAN technologies don't extend far enough, and the wider-ranging wireless communications networks don't offer enough speed and reliability.

Wireless LANs are a terrific idea. They offer a lot of potential for IT managers because they enable the creation of new networks and the expansion of existing ones without the expensive, time-consuming task of pulling cable through walls and floors.

The current standard for wireless Ethernet, 802.11b, offers 11M bit/sec. network connections and reasonably effective security capabilities. The standard, also known as Wi-Fi, is widely used in offices, campuses and homes. Wi-Fi-compliant devices from different makers work well together.

But another new and incompatible wireless Ethernet is on the way. The follow-on standard, 802.11a (yes, b came first), is significantly faster — up to 54M bit/sec. This standard uses orthogonal frequency division multiplexing technology, in which the devices determine a set of noninterfering frequencies and then multiplex them and use them in parallel.

SPECIAL REPORT WIRELESS

This technique may be important for future telephone operations; with the newer standard, network carriers finally have a technology that will let them deliver high-quality service. But 802.11a will be incompatible with 802.11b devices and networks.

Get beyond the LAN level, however, and the wireless freight train slows to a crawl. Forget about megabits per second; what's available are 9.6K bit/sec. cellular-based connections that are too slow and unreliable for business use.

Using wireless carrier networks to access Web-based applications or back-end corporate data can be frustrating, says John Bolz, a systems architect at Wells Fargo & Co. in San Francisco. "I wouldn't give my worst enemy an application and expect them to be able to use it on a cell phone," he says. Bolz cites slow speed, poor coverage and latency problems that wreak havoc with application sessions as reasons why the bank may wait for the next generation of cellular technology.

Today's cellular communication networks share bandwidth for voice and data users and suffer from latency issues, spotty coverage, signal dropouts and typical throughput of 9.6K bit/sec. or less.

"Wireless in itself has so many retries due to the physical environment that it overwhelms the actual engineered data rates of the networks," says Don Popowski, technical manager of wireless Internet services at Motient Corp., a wireless communication services firm in Reston, Va.

But quality-of-service issues are the biggest problem for users, says Phillip Redman at Gartner Inc. in Stamford, Conn. "If you lose bits of data, you can lose the whole transmission," he says.

Speed is the big issue for Michael Murphy, director of IS support services at Minneapolis-based Carlson Hotels Worldwide. He says he'd like to give executives access to data via Compaq iPaq handhelds and wireless modems but adds that "even 19.2K bit/sec. is slow, by anybody's standards. And if you use a [virtual private network] or data encryption, it really cuts down on performance."

In addition to cellular networks that share data and voice, there are dedicated data networks that focus on e-mail and other low-bandwidth services. These offer a gaggle of competing and noninteroperable services whose availability varies widely by location.

Some wireless telecommunications services are simply circuit-switched cellular networks. Others are digital and support packet-switching but not native TCP/IP. Instead, the protocol rides on top of these systems, separating the application from the underlying transport mechanism and hurting reliability and performance.

Cellular carrier services fall into four basic categories: first-generation (1G) analog technologies, second-generation (2G) digital, and the emerging 2.5G and 3G technologies.

First-generation, analog cellular networks support 9.6K bit/sec. connections using standard modems, but throughput can be as low as 2,400 bit/sec., says Larry Mittag, chief technology officer at mobile systems integrator Stellcom Inc. in San Diego. "Maybe, on a good day, you can get 9,600 [bit/sec.], but you'd better have all the stars right," he says. A rule of thumb is to take a carrier's advertised data rates for any current and future cellular technologies and cut them in half, he says.

Second-generation networks such as Sprint PCS are digital. Throughput is about the same as for 1G networks, but "it relaxes some of the timing so that it won't time out with the latencies that you'll get on a cellular network, and it has better error transmission," says Mittag.

Second-generation technologies include Code Division Multiple Access (CDMA), Cellular Digital Packet Data (CDPD), Global System for Mobile Communications (GSM) and Time Division Multiple Access (TDMA).

2.5G, 3G and Data Networks

The emerging 2.5G technologies boost available bandwidth into the 64K to 144K bit/sec. range and use packet-switching technology, which supports bursts of data traffic more efficiently. For 2.5G networks, there are two primary technologies: general packet radio service (GPRS), and enhanced data rates for GSM and TDMA/136 Evolution (EDGE).

Third-generation wireless communication technologies support data rates of 384K to 2M bit/sec. and beyond. The packet switching is IP-based, making for efficient routing of data from the Internet through the carrier's gateway. The higher bandwidth may allow for better integration of voice, data and video signals.

Unlike 2.5G technologies, which simply provide software updates to existing carrier infrastructures, 3G technologies require new "base station" hardware at each tower. Consequently, the services aren't expected until next year or 2003. The current 3G competitors are wideband CDMA, which blends CDMA and GSM technologies, and Qualcomm Inc.'s CDMA 2000.

Wireless data networks offer an alternative to cellular-based radio. These networks aren't IP-based but are designed to support data. They typically offer good coverage and support low-bandwidth applications such as messaging. They also require the use of proprietary data modems embedded into products such as Research In Motion Ltd.'s BlackBerry devices.

These technologies won't evolve to compete with 2.5G or 3G services, analysts say, but they'll continue to provide a low-cost alternative for low-bandwidth applications. The primary network technologies are Mobitex, DataTAC and Reflex.

Quick Link

ONLINE EXCLUSIVES

- Wireless personal-area networks are hitting the streets, with Bluetooth leading the way:

www.computerworld.com/q?23001

- So, what's a "wireless gateway"? It translates Web sites so they're readable on mobile devices:

www.computerworld.com/q?23002

Ultimately, 3G technologies should deliver the improved reliability and performance that corporate users need.

"It's going to come down to two technologies: wideband CDMA and CDMA 2000," says Redman. But, he adds, while the technology might start rolling out next year, "we will see islands of coverage. It won't be contiguous like the cellular network is today."

In the meantime, the emerging 2.5G networks may be the best bet. Carson Hotels' Murphy is already eyeing AT&T Wireless Group's 2.5G pilot in Washington. With 2.5G, "we should be able to replicate the dial-up experience," he says. ◗

Wireless Network Technologies and Services

	Status	Generation	Analog/digital packet-switched	Leading carriers/ promoters	Maximum bandwidth	Susceptibility to dropouts	Coverage	Continuous connectivity
CELLULAR NETWORK TECHNOLOGIES								
CDMA One – Code Division Multiple Access One	Available	2	Digital, circuit-switched	Sprint PCS Group	14.4K bit/sec.	High	Fair	No
CDMA 2000	Planned	3	Digital, IP-based, packet-switched	Qualcomm Inc.	2.4M bit/sec.	Low	TBD	Yes
CDPD – Cellular Digital Packet Data	Available	1	Digital overlay on analog network, packet-switched	Verizon Wireless, others	19.2K bit/sec.	High	Good	No
EDGE – Enhanced Data Rates for GSM and TDMA/136 Evolution	Planned	2.5	Digital, packet-switched	AT&T Wireless limited deployment	384K bit/sec.	Predicted to be low	TBD	Yes
GPRS – General Packet Radio Service	Planned	2.5	Digital, packet-switched	VoiceStream Wireless Corp., AT&T Wireless	144K bit/sec.	Predicted to be low	TBD	Yes
GSM – Global System for Mobile Communications	Available	2	Digital, circuit-switched	VoiceStream Wireless	14.4K bit/sec.	High	Fair	No
TDMA – Time Division Multiple Access	Available*	2	Digital, circuit-switched	AT&T Wireless	14.4K bit/sec.	High	Fair	No
W-CDMA – Wireless Code Division Multiple Access	Planned	3	Digital, IP-based, packet-switched	European carrier standard	2.4M bit/sec.	Predicted to be low	TBD	Yes
WIRELESS DATA NETWORKS								
DataTAC	Available	NA	Digital, packet-switched	Motient Corp.	19.2K bit/sec.	Low	Good	Yes
Mobitex	Available	NA	Analog, circuit-switched	Cingular Wireless	14.4K bit/sec.	High	Good	No
Reflex (mainly for e-mail and paging)	Available	NA	Digital	Arch Wireless Inc.	6.4K bit/sec.	High	Good	No
Ricochet**	Out of business	NA	Digital, IP-based, packet-switched	Metricom Inc.	28K bit/sec. to 128K bit/sec.***	Low	Limited to 12 metro areas	Yes

*NA = Not applicable   TBD = To be determined   * Likely to be replaced by GSM   ** Ricochet filed for bankruptcy last month and has ceased operations   *** Can be higher*

The Mobi Access P

The pieces are all there to give mobile users access to corporate applications and data. The trick is getting them to fit together.

By Robert L. Mitchell

IN AN IDEAL WORLD, employees carrying handheld computers would have persistent wireless connections with access to a full range of corporate applications and data.

That's a nice dream.

But if you want to give mobile workers access to enterprise applications and data, focus on high-value applications and keep the scope small and well defined. IT professionals who have implemented such projects kept their focus narrow — and all were forced to make compromises when matching their business needs with today's technology.

At financial services firm Equitable Distributors Inc., for example, that meant providing the nationwide field sales staff with both wireless and dial-up access to its customer relationship management (CRM) software and

KATHERINE STREETER

building a thick client to ensure continuous access to applications and data on its Pocket PCs when wireless coverage is spotty.

By contrast, the city of Glendale, Calif., used a thin client for wireless access to a back-office building inspection application but is reassessing the design due to coverage problems in the nearby foothills. "Right now, if there's no signal, you're dead in the water," says chief engineer Neville Pereria.

Jim Lindner, president and CEO of Mitchell International, a San Diego-based provider of software and electronic-business systems for the insurance and automotive-repair industries, says users found the small displays on handheld devices inadequate. Insurance adjusters need access to parts information and diagrams, so Lindner gave them notebook computers with wireless modems.

SPECIAL REPORT WIRELESS

Despite a few curves in the road, however, all three organizations consider their mobile computing projects a success. Here's how they pulled it off.

Brokers Going for CRM

New York-based Equitable, a subsidiary of The Equitable Life Assurance Society of the United States, sells annuities and other financial products through brokers and other intermediaries. "Our biggest challenge is differentiating [ourselves] in a very crowded and increasingly commoditized market," says CEO Patrick Miller, so equipping field sales people with up-to-date information that they can take to client meetings has high value.

Equitable's home-grown Web-enabled CRM system, which includes a calendar, contact management and activity reports, initially wasn't accessible to remote users. The new system, currently in pilot, enables salespeople with Compaq Computer Corp. iPaq 3650 Pocket PCs to update brokers on current business activity and to e-mail or fax product quotes and brochures on the spot.

Salespeople can work off-line, dial in or connect over a cellular network using an Aircard wireless modem from Sierra Wireless Inc. in Richmond, British Columbia. Equitable uses an HTTP connection over a wireless network and the Internet to its CRM system via a wireless application gateway. Virtual private network software from Certicom Corp. in Hayward, Calif., provides connection security.

CIO Eric Jansen says Equitable built its Web-based CRM application in-house in Java and SQL Server 2000 but turned to San Diego-based Wireless Knowledge Inc. to build the client software using Embedded Visual Basic and SQL Server 2000 CE. A Wireless Knowledge Echo gateway server buffers sessions to smooth over connection drop-outs, compresses transmissions to accelerate performance and provides filtered views of accounts and data so everything fits on the screen — and within the iPaq's 32MB of storage. That's enough space to accommodate sales data on about 500 brokers, Jansen says, adding that compression is used to store more data. The gateway software also links mobile users to the company's Lotus Notes e-mail system.

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Mobile Computing Lessons

- **Start small.** Keep mobile computing projects narrowly focused with clear business objectives.
- **Size does matter.** The mobile device display must be large enough to fit the mobile user's needs. Some applications will never work on anything smaller than a notebook-size screen.
- **Less is more.** Filter data views down to what mobile workers need in the field.
- **Expect delays.** Wireless coverage is spotty and actual throughput is typically half the advertised data rate – or less.
- **Thicker is better.** A thick client can help compensate for spotty wireless coverage and slow connect speeds by allowing for off-line data access and updates.

Jansen emphasizes the importance of starting with a narrowly focused application. "It was very important that we deliver a function set that our folks could digest," he says. "We want them comfortable with the device, with a small set of applications. We want to walk before we can run."

Equitable is still deploying the system to 110 field salespeople, and Jansen says user acceptance has been an issue. "Getting the user community to keep pace with it as they do their jobs has been a challenge," Jansen says.

It's too early to calculate payback, but Jansen says he already sees benefits in terms of being able to link activity into the management reporting structure. Miller declined to give budget specifics but says, "The budget for this project was tightly managed relative to what we were trying to accomplish."

Gateways for Inspections

The Glendale city government automated its building inspection system so that more than 20 inspectors and engineers could review and update permits in the field, eliminating the need to travel to the office to update records. The system has paid for itself in improved productivity since its launch in January, Pereria says. But he's had his share of problems getting set up.

Permit data currently resides in an Oracle Corp. database connected to an application server from Kiva, a wholly owned subsidiary of Accela Inc. in San Francisco, that serves up forms and screens to in-house users running Oracle client software. For remote access, Pereria wanted the low maintenance of a thin client, so Kiva added a Macromedia ColdFusion server that replicates the forms for Web browser access. He then gave users the choice of a Pocket PC from Compaq or Hewlett-Packard Co. or a Fujitsu Ltd. LifeBook B Series touch-screen subnotebook with wireless cellular modems.

With wireless throughput over the AT&T Wireless Services Inc. network at an "extremely slow" 9.6K bit/sec., Pereria decided to strip the forms down to the minimum data and field names needed to do the job. Inspectors liked the system, but Pereria became a victim of his own success when users wanted full access to the data. When he complied, page-load times increased to more than 35 seconds.

Pereria decided to add a wireless gateway from InfoWave Software Inc. in Bellevue, Wash., which reduced communication overhead and compressed the data. He also added "connector" software to the gateway to

Quick Link

ONLINE EXCLUSIVES

- Companies implementing wireless projects often overlook the need for ROI and cost-control metrics.

www.computerworld.com/q?22748

- Columnist Nicholas Petreley says standards are vital to wireless success. But will logic or chaos prevail?

www.computerworld.com/q?23113

The Mobile Access Puzzle

Continued from page 29

support access to the city's Microsoft Exchange e-mail system. Throughput improved to 48K bit/sec. and page-load times dropped to two seconds, he says.

That solved, Pereria soon discovered that even within a relatively small geographic area like Glendale, wireless coverage can be spotty. "Up in the foothills and canyons, I get no coverage," he says. Because the system has no off-line support, inspectors must use paper in those areas.

Pereria's options are limited. Kiva partnered with AvantGo Inc. in Hayward, Calif., to offer a system that caches pages and lets users update them off-line. But that vendor supports only Windows CE and Wireless Application Protocol devices, and most inspectors have opted for larger-screen Fujitsu notebooks that run Windows 98. Pereria says he hopes AvantGo will develop a custom work-around.

Outside the foothills, Pereria says, the system works well. He expects to recover the hardware and software cost of setting up the mobile infrastructure — at about $1,800 per user plus $2,300 per Fujitsu notebook and $1,100 per Pocket PC — in time savings from reduced travel and elimination of redundant data entry. But, he cautions, IT professionals should do their homework before embarking on a mobile computing project. "Know what technology is out there . . . and know what works for your discipline," he says.

Making Claims

More than 40,000 insurance adjusters, claims adjusters and appraisers use data from Mitchell International to write up estimates and authorize payment for auto insurance claims. A new thick-client wireless application, developed by San Diego-based mobile integrator Stellcom Inc., lets adjusters access that data and complete claims at the time they inspect the vehicle.

Mitchell considered using Pocket PCs, but the need to display diagrams and allow user feedback meant using at least a 7-in. screen. Adjusters carry heavy-duty notebooks such as Panasonic Toughbook models from Matsushita Electric Corporation of America. Initially, Mitchell used wireless modem PC cards to connect to San Jose-based Metricom Inc.'s Ricochet wireless data network. The always-on modems let Mitchell push new assignments and data down to the adjusters. "Our clients have seen 20% to 25% productivity increases by not having to go to the office to pick up assignments . . . and being able to upload and download information on a real-time basis," says Lindner. About 100 of its 10,000 users are involved in the initial pilot.

Claim document sizes of 1MB and the intermittent nature of wireless connections initially presented a problem. "I think our biggest challenge was handling the connections and line drops," says Lindner. To handle this, Stellcom created middleware that optimizes connections and restarts an interrupted transmission where it left off.

But Metricom's recent filing for bankruptcy protection forced Mitchell to use slower cellular networks and Cingular Wireless' data network services, which don't support continuous connectivity and make large file transfers more troublesome.

With Metricom, the biggest issue was coverage, Lindner says. Now it may be bandwidth. "Metricom going away leaves a major hole," says Stellcom's Chief Technology Officer Larry Mittag, noting that the throughput was better than that of other wireless networks.

New 3G wireless technologies will fill the gap, but Mittag doesn't expect to see them before the end of next year. So, like many other organizations, Mitchell will have to wait for the technology to catch up with its needs.

The pieces for a corporate mobile computing architecture are starting to fall into place, but practitioners and analysts agree that the technology is still immature.

Successful projects require an understanding of the technology's capabilities and a focused objective, says Mittag. "If you don't come in with a clear business idea that will present clear measurable ROI, then you will end up with a technology that looks neat but doesn't do much for the business," he says. ▶

Middleware Goes Mobile

One way to provide wireless access to corporate data is to put client software on a **Palm** device or **Pocket PC**, and install a synchronization server that connects directly to back-end systems, such as a **DB2** or a **Oracle database** using Open Database Connectivity or other standard protocols.

However, these systems typically support only one mobile device type and one back-end application. Another approach – using a Web application server and providing browser access – requires re-creating Web pages to fit the screens of different mobile devices.

A wireless gateway, such as **Infowave Software Inc.'s Wireless Business Engine** or **IBM's EveryPlace Suite**, solves these problems by acting as a middleware layer between back-end applications and mobile devices, and it can serve as a single control point for mobile access to multiple applications.

Most vendors offer interfaces for a wide variety of mobile devices and a few common back-end applications, such as e-mail. These gateways typically offer one or more of the following features:

- **Filtered views of data and re-rendering (also called transcoding) of content** for smaller screens or for converting HTML pages to Wireless Markup Language.
- **Automatic detection** of the client device type.
- **Improved throughput over wireless networks using compression and other acceleration techniques.** One performance issue, for example, involves communication protocols. A Wireless Application Protocol browser using the UDP/IP protocol is designed to minimize network protocol overhead. But for handheld devices, a full HTML browser interface with HTTP access may be preferable. That requires TCP/IP – a chatty protocol that bogs down over wireless networks. Wireless gateways use proprietary compression techniques to minimize this overhead and speed up the connection.
- **Encryption techniques to secure data streams.**
- **Session persistence by addressing wireless network latency and dropout issues.** A gateway acts as a buffer between the remote device and application, using techniques such as network spoofing to keep existing sessions running smoothly even when a remote user temporarily loses the connection.

The wireless gateway field is crowded with players today, but with the demise of wireless gateway vendor **NetMorf Inc.** in March, a shakeout may be coming. That could be a problem for IT managers who end up locked into one gateway vendor's product, which may include customized, proprietary technology. "I think a lot of those companies are going to disappear," says James Governor, an analyst at Nashua, N.H.-based **Illuminata Inc.**

Most of the vendors know wireless well but are weak at integrating their systems with legacy and custom applications, Governor says. The survivors will be companies (like IBM) that can pull all the pieces together. Smaller vendors will bridge the gap through partnerships, he says. He points to **Wireless Knowledge**, which has a strategic partnership with Microsoft.)

Governor says he thinks these stand-alone gateway servers will be integrated into Web application servers from companies like **BEA Systems Inc.** and **IBM**. But Mike McGinnis, director of mobile e-business at IBM, says that while its Everyplace Suite wireless gateway integrates well with its WebSphere application server, both will remain physically separate.

"What's going to drive the scalability of a Web application server? It's transaction load. What's going to drive the [wireless] gateway is the number of connected clients, whether they're doing transactions or not. We see the two scaling for different reasons," he says.

– Robert L. Mitchell

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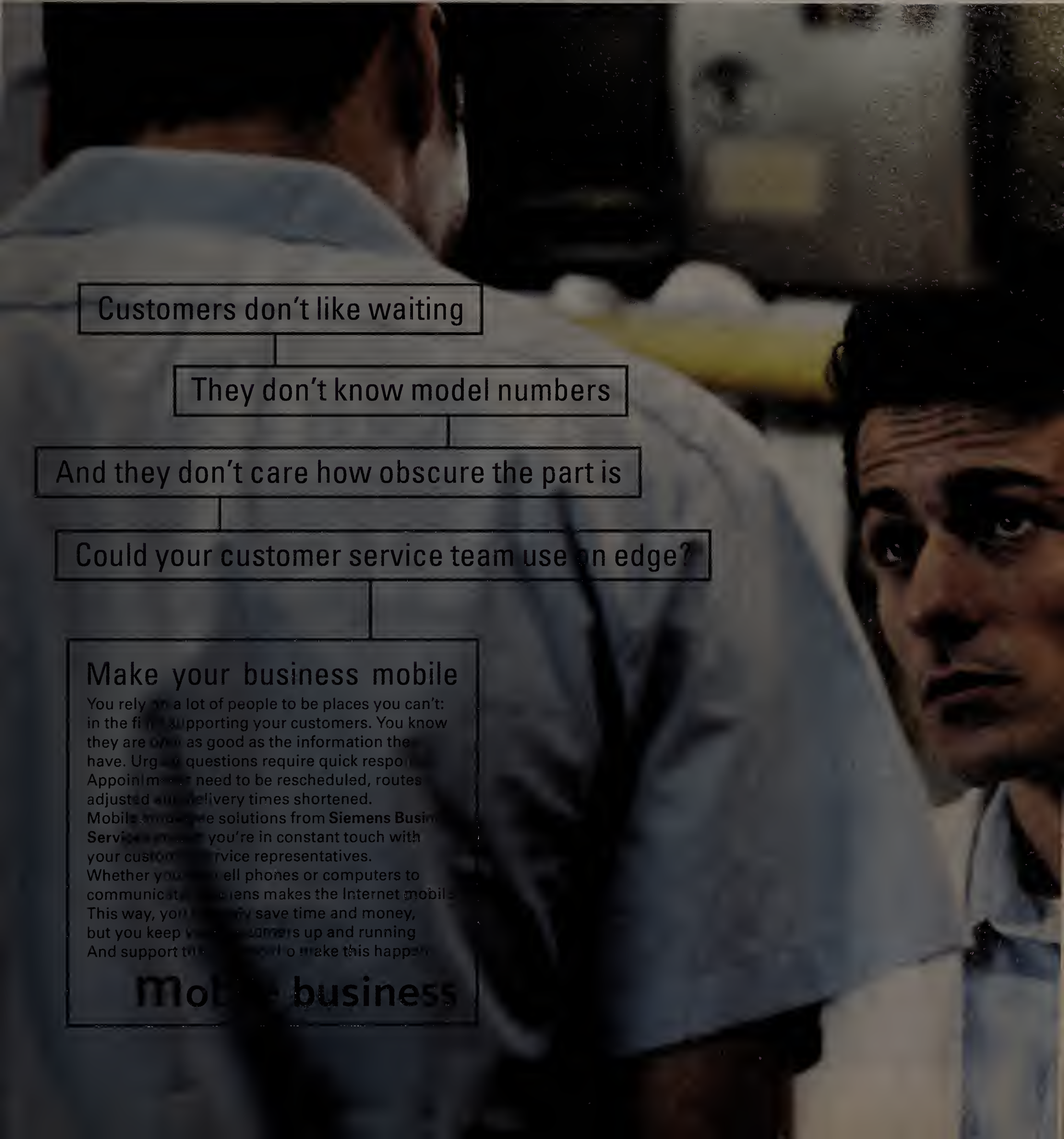

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They don't know model numbers

And they don't care how obscure the part is

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Mobile business

SIX
DANGEROUS
MYTHS
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Nothing could be further from the truth. In times of economic downturn, it may seem prudent to put the whole e-Business issue on the backburner. But it's not. Tough times call for speed, nimbleness and agility more than ever. The time to get smart and implement e-Business solutions for your customers is today.

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A WEBSITE IS A PORTAL. A PORTAL IS AN e-BUSINESS.

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WORKS BETTER WHEN EVERYTHING WORKS TOGETHER™

Bridging the L

For remote locations, Internet connections require some wireless ingenuity. By James Cope

SPECIAL REPORT WIRELESS

BACK IN 1999, Jim Williams, IT manager at Welch Packaging Group in Elkhart, Ind., found that a speedy, cost-effective wired connection to the Internet simply wasn't available.

So, like people at hundreds of other small and midsize businesses, Williams turned to a fixed wireless technology to bridge that last mile between his business and the Internet.

Williams explored a range of services, including dial-up and a fractional T1 line, but found the former too slow and the latter too expensive. Finally, he elected to use a local Internet service provider that offers wireless access from cellular towers using the 11M bit/sec. 802.11b wireless LAN standard.

The service, from MicroVillage Internet Services in Mishawaka, Ind., operates in the 2.4-GHz frequency spectrum to link business users and consumers in a two-county area to an Internet backbone.

Elsewhere, companies are using other wireless technologies for last-mile connections, including Multichannel Multipoint Distribution Service (MMDS), which provides T1 speeds to users within 35 miles of a central tower; Local Multipoint Distribution Service (LMDS), which is faster than MMDS but limited to shorter distances; two-way satellite service; and through-the-air laser signals.

Dial-up Internet access via Digital Subscriber Line (DSL) wasn't an option for his company, Williams explains. "We were too far from the [central office] for DSL, and even a partial T1 was going to run us over $500 per month," he says.

"Wireless was cheaper," Williams says. "And it gave us more bandwidth [than the partial T1]."

Williams says he pays $450 a month for his service and is guaranteed a transfer rate of 128K bit/sec. But he notes that average throughput is much higher; he regularly gets burst speeds of up to 3.5M bit/sec.

Reliability was at first a little dicey, Williams says, because the 2.4-GHz signal must have a clear line of sight. But erecting an 80-foot tower solved the problem and provided the antenna platform for a wireless LAN based on Aironet technology from Cisco Systems Inc. The wireless LAN connects two other nearby packaging plants that Welch obtained when it acquired another company.

The fixed wireless setup uses unlicensed spectrum, which is a little risky because there are no regulations against interference from other devices, such as microwave ovens and portable phones, that use the same frequencies, says Lisa Pierce, an analyst at Giga Information Group Inc. in Cambridge, Mass. Still, MicroVillage officials say they haven't experienced any major interference problems.

Chris Brewer, MicroVillage's network operations manager, says he has one site that's seven and a half miles from the nearest tower, but he prefers to limit transmission distances to no more than four miles. The cost of installation is $400 for business customers.

Distance from the service provider's antenna is less of an issue for MMDS wireless users like Todd Gorman, operations manager at Gorman Uniform Service Inc., a uniform rental business in Houston. Gorman contracted with Sprint Corp. to provide MMDS broadband wireless to his business.

MMDS operates over a licensed wireless spectrum at 2.6 GHz, which was originally used by local wireless cable TV operators to send signals to subscribers' homes. The TV application, however, ultimately lost out to coaxial cable.

Now Sprint and WorldCom Inc. are using the 2.6-GHz spectrum to provide broadband wireless network connections. Sprint is the most aggressive in this sector, says analyst Lindsay Schroth at The Yankee Group in Boston. WorldCom seems to be waiting for Sprint to work out any kinks in the technology before it presses ahead, she says.

Sprint's MMDS service is now available in 14 large markets including Chicago, Denver and Phoenix, says the company's vice president of wireless operations, Cameron Rejali. A central MMDS antenna like the one Sprint has placed on top of the Sears Tower in Chicago can reach customers within a radius of 35 miles, Rejali says.

Gorman chose MMDS wireless even though he had access to DSL and T1 services. Why? "Sprint [wireless service] was the cheapest for the speeds we got," he says. The MMDS service, which Gorman says costs him $149 per month, is comparable in speed to a T1 line that Reston, Va.-based XO Communications Inc. priced at $700. Both have burst speeds of up to 1.5M bit/sec., Gorman says.

Wireless access was an even better deal than wired DSL, according to Gorman. He says the local telecommunications provider, Southwestern Bell Telephone Co., a unit of SBC Communications Inc. in San

Sometimes Only Lasers Or Satellites Will Work

Satellite may be the only alternative for last-mile connections in really remote areas.

For example, the University of Alaska, Fairbanks, is deploying satellite technology from StarBand Communications Inc. in McLean, Va., to connect schools, libraries and municipalities in remote areas of the state. For both StarBand and the university, it's a test to see how well satellite networks – with downlink speeds of 300K to 500K bit/sec. and uplink speeds of 60K to 150K bit/sec. – perform in the harsh Alaskan climate.

Mike Sfraga, director of program development at the university, says many parts of the state don't even have dial-up connections, and those that do offer woefully slow Internet access. "It's not practical to dig trenches and bury fiber in ground that has been frozen for eons," Sfraga says. He notes that most remote sites are more than willing to put up with latency of about 650 milliseconds in return for wireless connectivity with some respectable bandwidth.

There's wireless bandwidth aplenty for TV and radio station operator Fisher Communications Inc. in Seattle. Fisher's CIO, Larry Ice, says he chose a 100M bit/sec. through-the-air laser connection from Terabeam Corp. in Kirkland, Wash., to link office buildings. Terabeam's laser ring in Seattle bounces from building to building, creating a metropolitan-area network in the air. It eliminates the hassles of gaining building access for optical fiber, Ice says.

Laser transceivers are placed behind building windows and hook directly into Fisher's LAN. "The system has been up and running for 60 days without issue," says Ice.

– James Cope

MARC BERLOW

AN 80-FOOT ANTENNA TOWER improved the reliability of Welch Packaging's 802.11b wireless connection to the Internet, says Jim Williams.

Antonio, wanted $300 to $400 a month to provide DSL lines. Gorman has been using the Sprint MMDS service for five months and says it's been very reliable, with one exception: The proxy server located between the uniform company's LAN hub and the Sprint MMDS modem has gone down a few times. "When that happens, I reset the IP addresses to restore the service," he explains.

Wireless at Wired Speeds

The higher the wireless frequency, the greater the bandwidth a given spectrum can accommodate. However, as frequency and bandwidth increase, transmission range decreases.

But in the case of Spirent Communications in Calabasas, Calif., a division of U.K.-based Spirent PLC, bandwidth, not distance, was the main issue when it came time to connect its main facility to another building a half-mile down the road. Tom Sommer, Spirent's network manager, says a DS3 private line would have provided the bandwidth his company needed between the two sites, but the $5,000-per-month fee would have blown his budget.

Instead, Sommer shelled out $18,000 for point-to-point wireless Ethernet equipment from Western Multiplex Corp. in Sunnyvale, Calif. The system runs over license-free spectrum in the 5.3-GHz range. At 45M bit/sec., the link is equivalent to the bandwidth of a DS3 for data, plus it has a separate channel for telephone services.

Certainly, Spirent's connection is plenty fast as wireless goes, but even higher wireless speeds are possible. The licensed 28-GHz spectrum, 90% of which is owned by XO Communications, can accommodate speeds of up to 622M bit/sec. for distances of three to five miles.

As for LMDS, a flurry of bankruptcies this year among LMDS service providers, including Winstar Communications, Teligent Inc. and Advanced Radio Telecom, has put a damper on that technology, says Pierce. While LMDS struggles for a footing in the U.S. market, analysts expect MMDS technology to advance under the auspices of Sprint and WorldCom. ◗

ONLINE EXCLUSIVE

■ A broadband connection is important to Chandra Whelton, Internet sales manager at Larry Roesch Chrysler Jeep in Elmhurst, Ill. She says the dealership gets 30% of its sales – not leads, but sales – from the Internet. So after two DSL providers in a row declared bankruptcy, Whelton decided to forgo wires and asked Sprint to install MMDS broadband fixed wireless. Read the story of this installation at: **www.computerworld.com/q?23108**

A Primer on Wireless Last-Mile Technologies

802.11b

Speed: 11M bit/sec.

Description:

- Line-of-site transmission of up to five miles
- Potential for interference from other unlicensed devices operating in the same spectrum
- No control over addition of new devices in the area that might cause interference

Multichannel Multipoint Distribution Service (MMDS)

Speed: 512K bit/sec. to 5M bit/sec.

Description:

- Line-of-site transmission of up to 35 miles
- Licensed spectrum; one provider per market
- Available in certain markets from Sprint and WorldCom

Local Multipoint Distribution Service (LMDS)

Speed: Up to 622M bit/sec.

Description:

- Line-of-site transmission of up four miles
- More susceptible than MMDS to weather disruptions, particularly rain

Laser

Speed: Up to 100M bit/sec.

Description:

- Line of site transmission of about 1,300 feet normally, but possibly more than a mile in clear, dry climates
- Point-to-point connections to the Internet
- Point-to-multipoint to connect buildings and then connect to the Internet
- Dense fog or snow can disrupt service

Low-cost Satellite

Speed: 300K-500K bit/sec. downstream; 60K-150K bit/sec. upstream

Description:

- Line-of-site of approximately 20 degrees above the horizon in the southern sky
- High latency
- Works in remote areas where no wireless-to-wired connectivity is available

ong Last Mile

Coping With Developmen

Early wireless adopters are cobbling together applications with a hodgepodge of tools and no standards to guide them. By Lee Copeland

A GROWING NUMBER OF CORPORATIONS believe wireless applications can deliver immediate business returns, but some early adopters are wrestling with myriad development challenges — insufficient tools and standards, interoperability concerns and usability issues — as they scramble to craft applications for mobile computers and devices. Consider the following examples:

- Wichita, Kan.-based Cessna Aircraft Co. uses the unlikely combination of Cobol and Gee-Whiz Basic (GW-Basic) for its 2-year-old wireless inventory-tracking application.
- Stockholm-based Scandinavian Airlines System (SAS) AB, a $5 billion airline, developed its wireless flight status and rebooking application with beta code from Microsoft Corp.
- Chicago-based Corrugated Supplies Corp. adopted a hybrid approach for its wireless inventory application, developing it with Microsoft's ActiveX controls and Visual Basic on the front end, and Java and San Francisco-based Macromedia Inc.'s ColdFusion on the back end.

SPECIAL REPORT WIRELESS

These projects illustrate the hard choices companies face with wireless development. They're solving today's problems with wireless applications built with a hodgepodge of tools but may have to migrate to another development environment or device down the road.

Instead of standardizing on one set of tools, developers will have to take a pragmatic approach as wireless device platforms continue to emerge, opting for the tools that are best suited for a particular wireless platform, says Peter O'Kelly, an analyst at Patricia Seybold Group Inc. in Boston.

But some users say the bottom-line gains are worth the development challenges.

Corrugated Supplies says that by providing wireless access to its order fulfillment, manufacturing and shipping applications, it cut order fulfillment times from an average of three days to just 18 hours, trimmed paper waste by 35% and eliminated order backlogs to nearly zero, says Dave Pung, director of information systems at Bedford, Ill.-based Corrugated.

Pung says he opted to keep the application's architecture open, using the languages that were best suited for the different parts of the wireless application.

"It's hard to make a concrete decision right now because of the battle between Microsoft and Java," Pung says. "Everyone is struggling for their positions."

To beef up its internal inventory controls, Cessna developed a real-time, wireless equipment-tracking application. The software allows Cessna to track inventory levels of perishable tools— drill bits, mills and reamers — when workers swipe their badges over bar-code scanners at inventory cribs. That simple process has cut costs, decreased production delays and improved inventory accuracy and ordering, says Randy Thone, project leader of facilities systems and programming at Cessna.

But that application runs on scanners from Woburn, Mass.-based TechLogix Inc. developed in the now-obscure MS-DOS, Microsoft's first operating system for the PC. Cessna's Cobol inventory application gets transmitted via a 2.4-GHz wireless signal to the handheld device. To keep the application running when the frequency gets lost or fails, as it frequently does, Thone crafted a DOS-compatible GW-Basic backup application.

"It was what was available," Thone says of GW-Basic. "The operating system was DOS, and [the manufacturer] said, 'Here's the unit. Program in any language, as long as it's stand-alone executable.' "

GW-Basic wasn't Thone's first choice, but the system works, and Cessna has no plans to migrate to newer technology. But the company does plan to develop a wireless maintenance management and order delivery application next year. Thone says he intends to use Microsoft's Windows CE for that project. More hardware manufacturers are supporting Windows CE, he says, which will make developing the next application much easier.

And despite the growing proliferation of wireless networks and applications, there's no clear leader in development platforms, according to a study by Santa Cruz, Calif.-based market research firm Evans Data Corp.

Evans puts Sun Microsystems Inc.'s Java 2 Micro Edition (J2ME) only slightly ahead of products from competing embedded operating system rivals Palm Inc. and Microsoft. Evans found that 30% of developers plan to use J2ME for mobile development projects, while their second choice was Palm OS with 25%, followed by Windows CE with 22%.

Even a wireless application written on one of those popular and well-supported platforms faces usability issues because of the constraints of small device interfaces.

Wireless Pilots

Ingram Micro Inc., a $31 billion distributor of computers and electronics, plans to test whether its customers want to order its computer products over cellular phones. The pilot project will allow a limited number of customers in the government sector to place orders via cellular phones from Sprint PCS Group. Ingram developed the J2ME application with

San Francisco-based Brience Inc.

Ingram opted for a small pilot program because of usability concerns, says Guy Abramo, chief strategy officer and CIO at Santa Ana, Calif.-based Ingram. Another wireless project launched this year, which gave Ingram executives and senior staff wireless access to e-mail and calendaring via Reseach In Motion's Ltd.'s BlackBerry devices, went off without a hitch.

But Abramo questions the suitability of the cellular phone handset interface for complex tasks such as order entry. Wireless access to e-mail via the BlackBerry works because it offers an easy-to-use miniature keyboard.

"Will people really use a wireless device to place an order?" Abramo asks. "We'd like our customers to order parts from a wireless device right from our Web site, but before we spend a lot of money, we want to see how it's accepted."

Providing access to wireless e-mail, particularly with the popular BlackBerry device, is one of the most common wireless applications at the enterprise level, says Alan Nogee, an analyst at Cahners In-Stat Group in Newton, Mass. "There is a lot less with cellular phones, because the screen is so small that the process of getting information out of the phone is not an easy task," he says.

Jury Still Out

Pung says he nixed the idea of cellular access to Corrugated's order inventory data because of usability problems. "The screens are too small, and the information is too limited," he says.

Pung began a pilot program to test an order status application based on Wireless Application Protocol (WAP) phones, but in the end, he didn't move forward with it. "I tested the stuff out, but we decided there wasn't a gain or value to our business," he says.

With wireless development options still in flux, several firms are waiting on the sidelines.

"The inhibitor for us is the number of disparate devices," says Steve Zerby, e-business technical strategist at Owens Corning in Toledo, Ohio. "Once there is a de facto standard by manufacturers, we would see a consolidation of devices and protocols, and you'd see more being done. But right now, there are too many flavors."

When it comes to the advantages or disadvantages of J2ME-based tools compared with Microsoft's .Net framework and tools for wireless development, the jury's still out.

Both camps offer solid tools for wireless development, says O'Kelly. "The primary advantage of J2ME is that it's shipping," he notes. "But Microsoft isn't completely absent with .Net."

Although J2ME is already out, Microsoft won't ship its final .Net framework and tools until later this fall. But Microsoft has worked with several of its customers to get .Net-enabled wireless applications up and running.

Airline SAS developed one of the first wireless applications that uses Microsoft's .Net framework, tools and Mobile Internet tool kit. Built with beta code, the application allows fliers to check for flight delays and rebook reservations from WAP phones and handheld devices, such as Microsoft's Pocket PC and Palm's PalmPilot. It has been running in a production environment for the past four months, says Peter Muller, deputy director of sales and revenue management solutions at SAS.

But Muller says that developing applications with beta code poses some problems of its own.

"When working with a beta release, you're in dialogue with the developers, so it's inspiring, but it also causes some problems," he says. "Its challenging because it's change. When you develop, you want code that's fixed, but working on a beta — its like mucking through things. You know that next month something will change. So you do a fix here or a workaround there."

SAS, like Corrugated Supplies and Cessna, plans to take a hybrid approach going forward. The airline has selected IBM's Java 2 Enterprise Edition tools and Microsoft's .Net for its primary application development environment. After selecting the two vendors earlier this year, SAS asked them to create a proof-of-concept application that demonstrated solid interoperability between components of the .Net platform and IBM's WebSphere application server.

But the future's not bleak. Users report huge productivity gains from the applications that are in production right now, and analysts say the standards and tools will only improve over time.

"Wireless is in a serious transition right now," O'Kelly notes. "The problems we have today will seem quaint next year." ◗

DAVE PUNG of Corrugated Supplies says, "It's hard to make a concrete decision right now," when it comes to wireless application development, because of the ongoing battle between Microsoft and Java.

MARC BERLOW

t Chaos

Quick Link

ONLINE EXCLUSIVES

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Secrets in t

Unsecured wireless gear is coming in the back door, which means corporate secrets can be plucked out of the ether. You need a security plan. By Deborah Radcliff

KATHERINE STREETER

EVEN AS YOU READ THIS, some of your corporate gear-heads are installing wireless base stations and network interface cards (NIC) behind your back. They may not know it, but they're essentially broadcasting the message "Here I am" to the world around them.

In that world are hackers like Dr. Who (in the Boston area) and Pete Shipley (in the San Francisco area), who drive around with their own wireless NICs in what's called promiscuous mode. The hackers' NICs are picking up the signals and Media Access Control (MAC) addresses of your company's broadcasting devices and using them to map your network access points. They can then impersonate those MAC addresses to waltz right into the wired network.

"Corporate information is floating through the air, and the company doesn't even realize they're wireless," says Ed Skoudis, vice president of security strategy at Predictive Systems Inc., an IT services firm in New York. "Of your Fortune 100 companies, the vast majority of them have wireless [networks]; they just don't know it yet."

It's too late to outlaw wireless access, because die-hard users will find ways to use it behind your back. But your company can mitigate risk with an effective wireless deployment policy that covers internal, remote and traveling workers.

The Risks

Rogue wireless access points open new avenues for old attacks, says Skoudis, who covers wireless security in his new book, *Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses* (Prentice Hall, 2001).

Uncontrolled wireless access means attackers can read e-mail, sniff for superuser accounts and passwords, and gain root or administrative access to certain machines. They can also drop in Trojan horses (hidden executable programs) like Back Orifice for remote

he Air

SPECIAL REPORT WIRELESS

monitoring and open other back doors into the network.

Wireless access points can also be subverted to launch attacks against other businesses, something that's trivial to do, according to Chris Wysopal, who runs a wireless hacking lab as director of research and development at @Stake Inc., a security services firm in Cambridge, Mass.

A comprehensive user and wireless security policy will help reduce those risks. Start by scanning your networks to find and map access points, the way Shipley and Dr. Who do. You can use your own wireless device to do this (the NICs ship in promiscuous mode), or you can use freeware and commercial wireless scanning tools to help map these access points.

Then start a user awareness campaign, suggests Katherine T. Fithen, senior manager of the cybercrime prevention and response unit at PricewaterhouseCoopers in New York. Tell them why wireless LANs need to be secured and update your user policy to treat wireless access points the same way you do modems.

To keep it simple, make wireless access policies look the same as all your other network access policies, says Dave Juitt, chief security architect at Bluesocket Inc., a wireless gateway vendor in Burlington, Mass.

"You need to put together a solution that doesn't get in the way of your workers doing their jobs," he says. "The ideal way to do this is to make all access coming from all technologies look exactly the same."

Security experts say wireless policies should include the following guidelines:

- The IT department must approve all wireless LAN access.
- All wireless network cards and base stations must be registered.
- Wireless NICs must be secured before they're issued. That includes turning off promiscuous broadcasting of MAC addresses, enabling the Wireless Encryption Protocol (WEP) and dropping the Service Set Identifier as the default password (it's easily sniffed from the parking lot).
- The corporate IT department should select, standardize and approve wireless security configurations. It should separate wireless traffic from the rest of the network with a firewall, use company-issued virtual private network (VPN) clients and install desktop firewalls and intrusion-detection systems on wireless computers.
- Quarterly audits (scans) for rogue wireless access points must be conducted.

VPN Hurdle

Of all these recommendations, VPNs offer the most promise — and the most trouble.

The key benefit is that a VPN can protect wireless connections from all locations, including those of home users and of road warriors connecting through public wireless access points, such as American Airlines Inc.'s Admiral's Club suites in airports. Public wireless bandwidth is unencrypted, so use of VPN client software is strongly recommended, says Ali Tabassi, chief technology and development officer at MobileStar Network Corp. Richardson, Texas-based MobileStar is the wireless access provider for Admiral's Clubs and for 500 Starbucks shops nationwide.

But a VPN for a wireless network is problematic because the WEP has several documented security problems, particularly low encryption levels and guessable private keys. Cisco Systems Inc., Santa Clara, Calif.-based 3Com Corp. and other vendors offer stronger authentication and encryption in their wireless NICs, but they're not interoperable.

According to Juitt, WEP's fatal flaw is in trying to do too much at the access point over a bandwidth that's too restrictive (5.5M bit/sec. each way).

Bluesocket and other vendors are coming to market later this year with products that push encryption and authentication up to the network layer so wireless encryption can take place at the traditional network security layer, where IP security also resides.

One Fortune 500 company that runs a lab with a lot of wireless access is beta-testing Bluesocket's product. The product solved the nightmare of deleting new users under a shared WEP key and allowed for role-based access rules, says a corporate engineer who tested the Bluesocket product and asked not to be identified.

In spite of WEP's problems, IT professionals say that establishing a workable VPN policy is key to holding onto corporate secrets and preventing corporate systems from becoming hacker launching pads.

"In a wireless world, users can no longer rely on the network to protect their data. They can't rely on the transport layer, either," says William Murray, a New York-based IT security consultant. "What that means is, in this environment, you have to be using end-to-end encryption." ◗

Eavesdropping From the Parking Lot

Some 300 purchasing managers at Fortune 1,000 companies have wireless networks in their near-term purchasing plans, according to John Pescatore, a security analyst at Gartner Inc. in Stamford, Conn. "Out of that, 20% already have wireless LANs they know nothing about," he says.

The reason, say Pescatore and others, is that wireless networking equipment is cheap enough that some power users will spend their own money for this convenience.

"Users are buying a $200 base station and spending $100 on a PC Card so they can go to conference rooms and other floors and still get network access. The problem is, so does the guy sitting in the parking lot," says Ed Skoudis, vice president of security strategy at IT services firm Predictive Systems.

Those guys in the parking lot can use wireless broadcasts to map access points and their MAC addresses. Then they can reprogram their own NICs to reboot as one of these legitimate network MAC addresses and get into your wired network as an approved user.

"I witnessed this in July at [the hacker conference] DefCon," says Winn Schwartau, president of Interpact Inc., a Clearwater, Fla.-based security information company.

Schwartau rode along as an observer in a convertible that circled the outskirts of Las Vegas. Within 15 minutes, the hacker seated next to him had picked up and mapped multiple access points and MAC addresses, Schwartau says.

"The screen will tell you the MAC address of the wireless device, the system ID, the name and type of router that's in use and exactly where that device is," Schwartau says.

In high-density areas, you don't even need to drive around. The signals, which transmit about 100 yards in each direction, will flow to you, says Chris Wysopal, director of research and development at security services firm @Stake.

"Even from our location here in Kendall Square, a block from MIT, we can pick up signals from lots of these networks running in the clear," Wysopal says.

– Deborah Radcliff

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- Simply installing a wireless LAN and expecting the default encryption settings to be enough to make it secure is asking for trouble. **www.computerworld.com/q?22934**

Ready for All-Thumbs Typing?

Wireless e-mail: It works if you work at it; it's great if you need it. But I don't. By Russell Kay

SPECIAL REPORT
WIRELESS REVIEW

LAST YEAR, *Computerworld* reviewed wireless e-mail products from Motorola Inc. in Schaumburg, Ill., and Research In Motion Ltd. (RIM) in Waterloo, Ontario. I didn't write that review, and, in fact, I've been relatively slow in warming up to the wireless age. But for this special wireless issue, I wanted to check out wireless e-mail for myself.

I thought about attaching a wireless modem to my Hewlett-Packard Co. Jornada 545 Pocket PC handheld, but it resulted in a package that was too bulky to carry easily. And I knew that if I couldn't carry the device in my pocket, I would, more often than not, forget to carry it.

After looking over what's available, I opted for the successors to those same two products reviewed last year [Technology, June 19, 2000]: Motorola's TimePort 935 and RIM's BlackBerry 957. The Accompli, an even newer Motorola device with a color screen, wasn't available in time.

The machines themselves are quite different. The TimePort, while less bulky than the earlier PageWriter model, is a chunky little clamshell-style device that comes with a plastic belt holster and a desktop cradle. The BlackBerry is slimmer — about the size of a Palm or Handspring handheld — with a much larger screen than the model previously tested (which is still available), a desktop cradle and a leather belt case.

Both machines have tiny QWERTY keyboards that are basically designed to be typed on with your two thumbs — or, if your hands are like mine, your thumbnails. This two-handed operation sounds cumbersome but works pretty well in practice. Both machines use graphic icons for selecting functions and retrieving information. Both use wireless data networks that cost about $50 per month.

With both machines, you can set an audible or vibrating alarm to alert you of incoming e-mail. Most functions other than typing are invoked with a few dedicated function buttons. I preferred the thumb-wheel arrangement on the BlackBerry, but the TimePort was convenient enough to use.

Unfortunately, I was unable to test the TimePort and Motorola's MyMail service, which came configured to work with Lotus Notes but required an enterprise version of the software to work on the Domino server. I did use it to send and receive a few messages directly, and it worked just fine that way. The BlackBerry wouldn't work with Notes either, but it handled Internet e-mail fine. I took it on a trip to the West Coast and used it to keep in touch with my family.

There's not much more to say about these two machines that's seriously different from Barry Bayer's earlier review. Both machines perform pretty well and do what they claim. If you really need or want anytime e-mail and are prepared to manage the traffic, they fit the bill nicely.

Managing the Mail

Regardless of which device you use, you need to make some important decisions about what mail you want to receive on your handheld. Almost certainly, you do *not* want to get everything you would normally get via e-mail, for several reasons: The small screens are tiring to read; you can't open attachments; lengthy replies are possible but tedious and time-consuming; and just wading through a couple of hundred messages on a handheld, many of which may be spam, is enough to ruin anyone's day.

Personally, I found the whole wireless experience disappointing. In particular, the thought of carrying yet another device (along with my cell phone and Jornada organizer) was simply more than I was willing to endure.

As you might expect of a computer product reviewer, I'm a certified gadget freak: I love to try out new toys, tools and gizmos. Relatively few devices, however, actually add enough value that I keep on using them beyond that tryout period.

It all comes down to need and convenience. I don't *need* to be constantly updated with news, customer contacts or anything else. And after trying it, I don't want to bother with it — certainly not at the current state of the art.

If I were in sales or customer service, however, I'd probably feel differently. But I don't live and work on the road. The burden of being wirelessly connected is more than I'm willing to put up with.

In another year or two, when perhaps all of those handheld devices are consolidated into a single multifunction device, I may feel differently. For now, I'll keep on waiting for something better. ◗

RIM's BlackBerry 957 is slimmer and has a bigger screen than its predecessor. ▶

Motorola's TimePort 935 has a chunky, clamshell-style design. ▶

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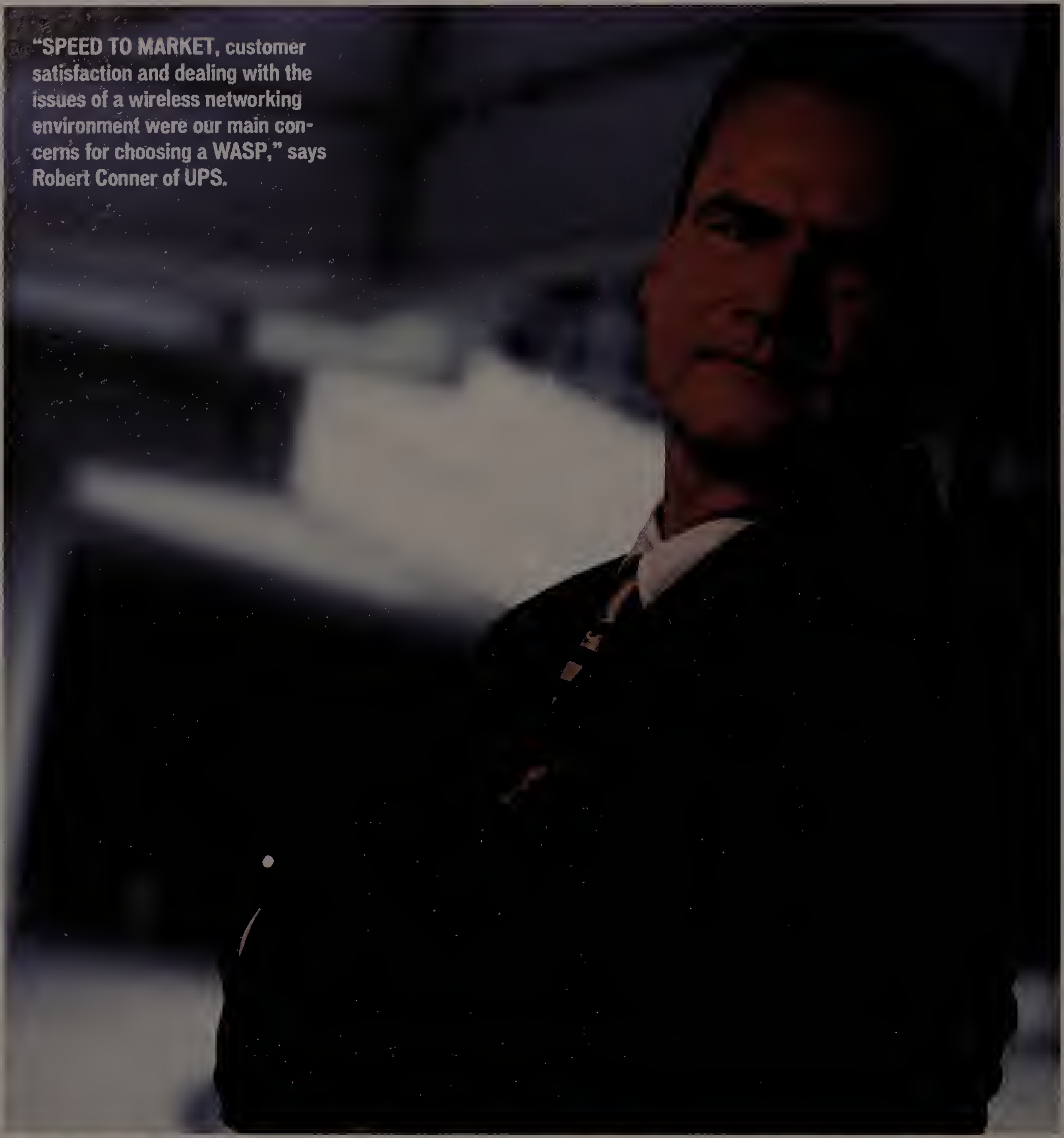
'Quick, Get Me Wireless'

Companies that need a wireless application ASAP are turning to wireless ASPs.

By Julie Sartain



"SPEED TO MARKET, customer satisfaction and dealing with the issues of a wireless networking environment were our main concerns for choosing a WASP," says Robert Conner of UPS.

ANN STATES/SABA

COMPANIES THAT WANT TO "get in quick" with a wireless project are turning to wireless application service providers, or WASPs, which promise to host applications and take the hassles out of technology selection and deployment.

Of course, that depends on the WASPs staying in business long enough to do so. It's a new, unproven business model, and analysts predict that some WASPs will fail.

SPECIAL REPORT WIRELESS

"WASPs are an untested concept on top of an untested concept. That's a tough thing to accept, much less manage," says Blaise Stephanus, an analyst at Enterprise Management Associates Inc. in Boulder, Colo.

So IT managers have to weigh the possibly fleeting nature of WASPs against the benefits. "The greatest advantage is their expertise," says Stephanus. "Wireless changes so rapidly, the burden of keeping up with the latest technology is like trying to hit a moving target. Wireless is the WASPs' central focus, so they understand all of its seemingly infinite tentacles."

That's what appealed to Atlanta-based United Parcel Service Inc. UPS had already developed application programming interfaces (API) in-house to link its legacy tracking systems to business customers, such as retailers that wanted to provide their cus-

Continued on page 44

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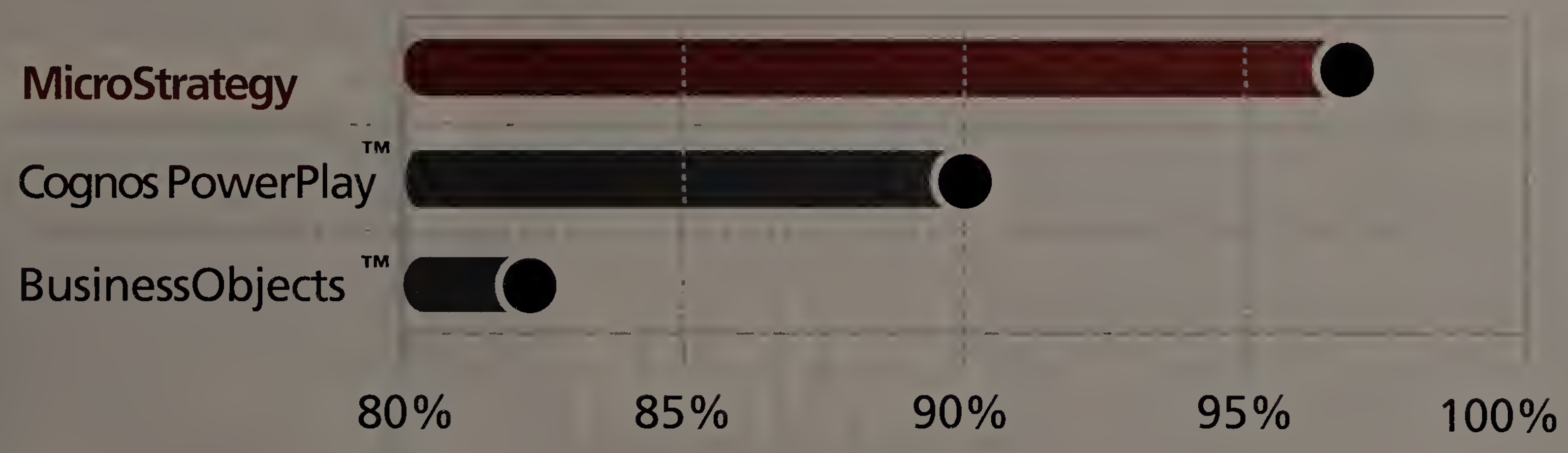

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'Quick, Get Me Wireless'

Continued from page 42

tomers with order-status information. When UPS decided to offer customers shipment tracking as part of a mobile information services package, it hired Air2Web Inc., a WASP in Atlanta. The company used the existing APIs to link applications to multiple types of wireless networks from different providers and configure them for a range of devices.

"Speed to market, customer satisfaction and dealing with the issues of a wireless network environment were our main concerns for choosing a WASP," says Robert Conner, senior director of interactive marketing at UPS.

"Our core competency is delivering packages, and we never want to lose sight of that," Conner explains. "The learning curve [for wireless] was too stiff, and the technology is too vast. I needed an expert to do this for me. Air2Web had the expertise, and they deployed in four months."

Other WASPs include 2Roam Inc. in Redwood City, Calif.; AlterEgo Networks Inc., also in Redwood City; Broadbeam Corp. in Princeton, N.J.; and GoAmerica Inc. in Hackensack, N.J.

In essence, WASPs host and manage wireless applications and leverage them across multiple clients to reduce costs. They can deploy the software, hardware, security and networks faster (and often cheaper) than most corporate IT departments. The devices, languages and applications are so diverse, individual companies would have to maintain a large, skilled staff to support these services in-house.

Bidwell & Co., a discount brokerage in Portland, Ore., asked 2Roam to write a wireless Web interface so that customers with wireless handheld devices could use Bidwell's Web site for investment research, account information, stock quotes and real-time stock trades. "We wanted to avoid having to build for, test, qualify and upgrade the software for an extensive range of wireless devices," says Jay S. Hemmady, the firm's vice president of technology. "We didn't want to deal with a wide range of carriers, and [by using] 2Roam, we avoided the need to keep up with this fast-moving technology."

Costs vary by application. WASPs could charge, say, $250,000 upfront to set up a very complex application, plus monthly fees for their service. But they can also offer limited services for fees of $50 to $100 per month per user.

And WASPs can work quickly. ViaFone Inc. in Brisbane, Calif., asserts that it built a wireless Web application for Santa Clara, Calif.-based Internet shopping service MySimon Inc. in just four weeks. ViaFone says it also delivered a wireless Web project for Fort Washington, Pa.-based CDnow Inc. (a unit of Germany-based Bertelsmann AG) in 14 weeks.

The WASP applications of most immediate interest to corporations include wireless e-mail and scheduling, sales force automation and inventory access, customer service and product support, and field service automation. Emergency communications systems for fire, police or medical facilities are other prime markets. All of these applications are primarily text-driven, so they don't require a lot of bandwidth.

Mike Logghe, information systems manager for the government of Los Alamos County in New Mexico, managed the wireless communications systems used by authorities fighting the Cerro Grande fire in May of last year. "With only a small shop, we had limited resources; there was no way we could handle it alone," he says. So Logghe turned to Integrity Networking Systems Inc., an Albuquerque, N.M.-based WASP, for voice and data communications links among the fire crews, police and medical teams within a seven-square-mile area.

"Phone lines were overloaded because of the fire, but we still functioned," Logghe says. "Companies like US West and others donated cell phones for the crisis, and in just a few weeks, we were all connected. The fire burned over 50,000 acres, and we had no injuries. The wireless communications were critical to the operation."

Of course, managing a WASP requires oversight and a detailed service-level agreement. But Larry Swasey, an analyst at Allied Business Intelligence Inc. in Oyster Bay, N.Y., says it isn't a big chore. "They manage themselves," he says. "All they need from their clients is trust, and that's not an easy thing for corporate IT managers to just hand over."

"I've had no problems managing the WASPs," says Logghe. "They have been very responsive, and if they all treat their customers like Integrity Networking has treated us, yes, the wireless providers will do well."

But analysts say the advantages of using a WASP may be short-lived. Once the state of wireless technologies becomes less complex and more standardized, some of the WASP advantage may evaporate.

Tim Scannell, an analyst at Mountain View, Calif.-based Mobile Insights Inc., predicts that the need for WASPs will diminish in two years. "It's a fast, get-it-now, do-it-now industry, and once it's standardized, the question will be, Who owns the service? Not the WASPs," he says.

Scannell and other analysts advise users to first explore the wireless capabilities of their current ASPs and begin with smaller, noncritical applications. "Keep the big applications in-house for now," Scannell warns. "Wireless is just not ready for mission-critical applications yet. Wireless is not a pleasant experience. It is slow, text-based and requires too much up- and download time."

Some WASPs are already shifting their business models, moving from hosting to selling their technology as licensed server products. Meanwhile, giants such as IBM, Oracle Corp. and Microsoft Corp. are lumbering into the wireless field.

"At this early point in the wireless application market, change is the only consistent factor," says Jennifer DiMarzio, an analyst at Summit Strategies Inc. in Boston. "The winners, losers and gorillas of wireless computing have not yet emerged, making it an exciting, if confusing, space to track." ◗

Sartain is a freelance writer in Ogden, Utah.

Is a WASP in Your Future?

A primer for companies considering working with ASPs:

Pros

- ▶ **Connectivity for multiple protocols and devices**
- ▶ **Fast deployment**
- ▶ **Wireless-savvy IT staffers**
- ▶ **Can evolve as the wireless industry evolves**
- ▶ **Frees corporate IT staff for other projects**

Cons

- ▶ **Not ready for large, mission-critical applications**
- ▶ **Life span uncertain; could go bankrupt**
- ▶ **Has to learn the client's industry**
- ▶ **IT managers lose some control**
- ▶ **IT staff can't support application if WASP fails**

Tips for using a WASP

- ▶ **Research the company and check references and staff qualifications**
- ▶ **Get a detailed service-level agreement**
- ▶ **Start with a small pilot project**
- ▶ **Investigate upgrade, scalability and integration issues**
- ▶ **Negotiate costs**
- ▶ **Select two IT staffers to monitor the WASP**
- ▶ **Have a backup plan**
- ▶ **Determine exit strategies**

ONLINE EXCLUSIVES

■ A researcher who monitors the wireless ASP industry says the fledgling market is constantly changing. But the benefits remain: lower cost and less complexity.
www.computerworld.com/q?22901

■ For tips on how to select a wireless systems integrator, read the stories at:
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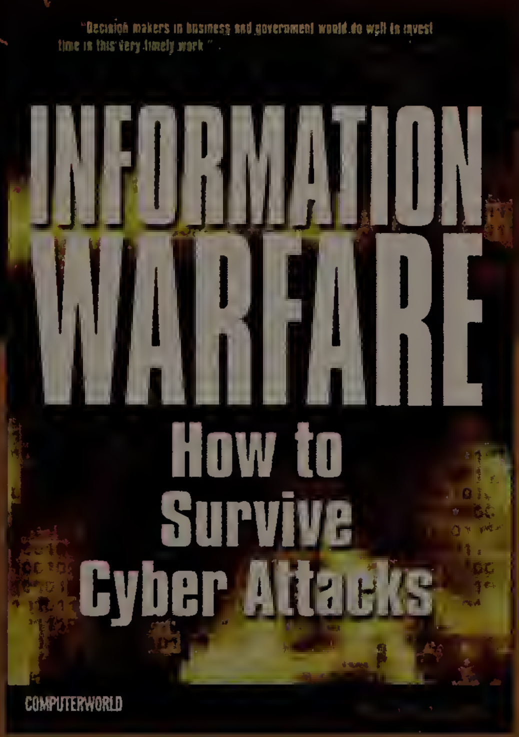
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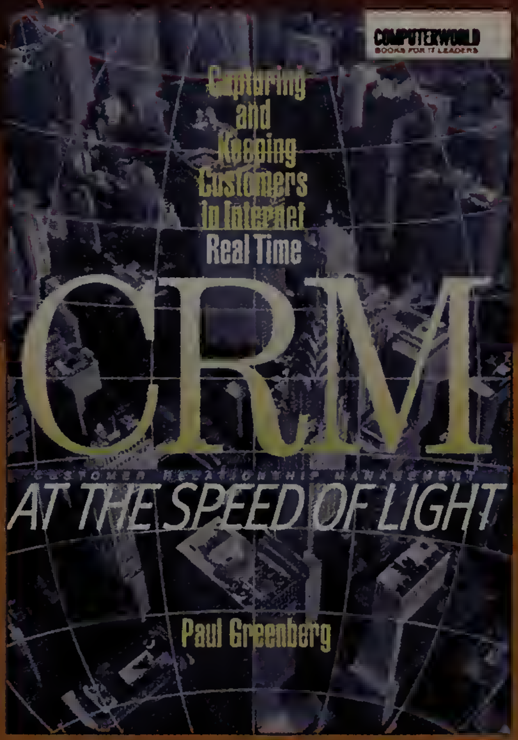
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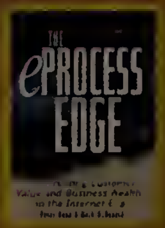

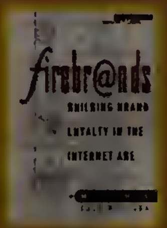

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Grow-Your- Wireless Ta

Wireless skills are scarce, but employers are willing to train people who already have business and IT savvy. By Sacha Cohen

WIRELESS TECHNOLOGIES HAVE reached out and touched nearly all industries: manufacturing, health care, telecommunications, retail and more. And as these technologies continue to infiltrate everyday life and business, the demand for IT professionals to develop and implement applications and devices is growing as well.

One IT manager who's frequently searching for qualified candidates is David Johnson, technical director at Madison Heights, Mich.-based EASi, a tier-one supplier to the automotive industry. His team of IT professionals helps develop wireless technologies that can be used in the auto industry.

SPECIAL REPORT WIRELESS

To keep up with demand, Johnson trains his engineers on a variety of technologies. These include mobile device limitations; Java, including Enterprise JavaBeans; XML; Palm Query Application development with Web clipping; and Palm-specific applications such as instant messaging, Wireless Application Protocol and Wireless Markup Language.

When he's hiring, Johnson looks for prior experience in developing for wireless technology or at least a solid understanding of how the system works. For example, the individual should know how a particular request might be processed, how the response is received on the device and how the data moves across devices.

Keeping up with emerging technologies like those used in the wireless sector is crucial, not only in boom times, but also when the economy hits a bump. With that in mind, smart managers such as Johnson are always on the lookout for qualified candidates who can step up to the plate at a moment's notice.

Johnson's search for qualified candidates is multipronged. The first and most effective method, he says, is through networking and word of mouth.

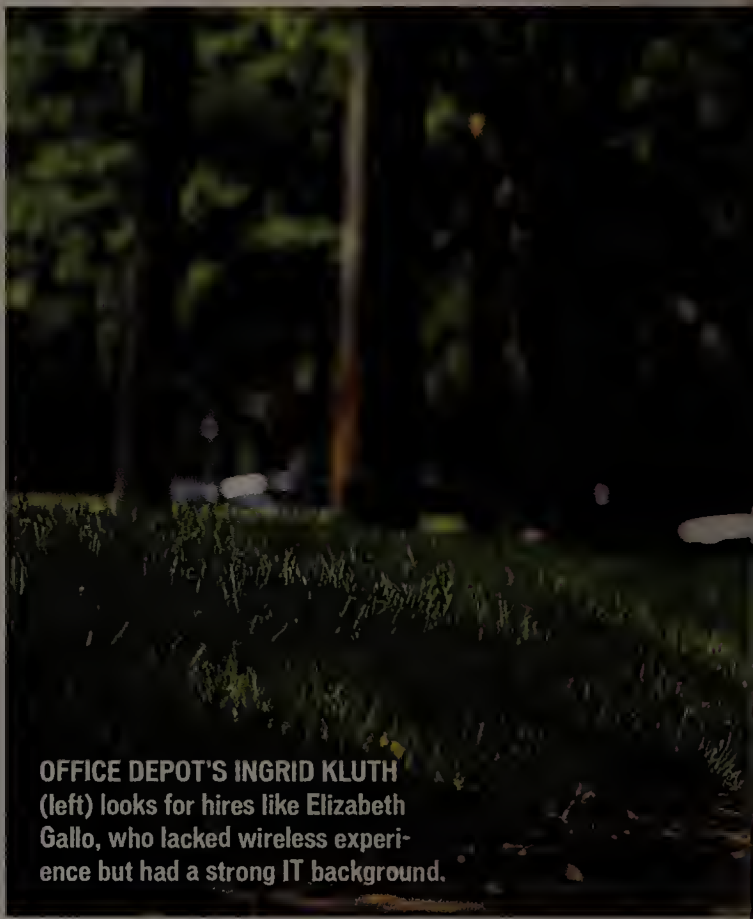
"We can typically find the best matches using this method," Johnson says. Other avenues include direct job postings through user groups, Internet career sites and regional newspapers; unsolicited résumés; résumé databases; and outside staffing specialists.

Although EASi has ventured into the wireless space, it's been a gradual move that has had its share of challenges. "We do feel there are many hurdles to jump over before we see a widespread use of wireless applications that support our customers," Johnson says.

Since the automotive industry relies heavily on large data files, there are bandwidth limitations, in addition to the challenge of visualizing large amounts of data, given the compact formats of today's wireless devices. Even so, Johnson says, he sees a growing demand from customers and subsequently the continued development of wireless devices and the need for IT professionals to work in that arena.

A Temporary Slowdown

The wireless sector isn't immune to the economic slump and has seen its share of tough times this past year. Telecommunications behemoths such as Schaumburg, Ill.-based Motorola Inc. and Espoo, Finland-based Nokia Corp. have faced disappointing sales and decreasing stock prices. And Russ Gray, managing director of telecommunications at recruiting firm Christian & Timbers in Cleveland, says that because of the worldwide economic slowdown, IT and telecommunications professionals of all types are in many ways in a wait-and-see scenario.



OFFICE DEPOT'S INGRID KLUTH (left) looks for hires like Elizabeth Gallo, who lacked wireless experience but had a strong IT background.

"The number of individuals required today is less than it was a year ago, and companies are much more selective in their process," Gray says.

Although the demand for experience in wireless technologies is up, hiring has decreased by an estimated 20% because of the business downturn, agrees Neil Fox, CIO at Philadelphia-based Management Recruiters International Inc.

Despite the temporary slowdown, wireless continues to be a fast-growth area. Analysts at Gartner Inc. in Stamford, Conn., forecast that there will be 800

RED MORGAN

Resources for Your Wireless Career

Ready to get into the wireless arena? While you don't necessarily need to be an expert in WAP, 802.11 or Bluetooth, wireless companies tend to look for individuals with experience in Java, C++, XML and object-oriented design. Here are a few resources that offer training, discussion groups and all the news you'll need to get up to speed on wireless technologies and keep up in this fast-growing market:

►**Wireless Developer Network** ***www.wirelessdevnet.com/training/***
Learn about new technologies, training opportunities and more.

►**AnywhereYouGo.com**
For wireless application developers, this site covers devices and dominant competing technologies, such as WAP, Bluetooth and Short Messaging Service.

►**IT Toolbox (Wireless)** ***http://wireless.ittoolbox.com***
Technical information, news, industry coverage and commentary for IT professionals interested in mobile computing and communications.

►**Cellular Telecommunications & Internet Association** ***www.wow-com.com***
Founded in 1984, this international organization represents all elements of wireless communication (cellular, personal communications services, enhanced specialized mobile radio and mobile satellite services) and serves the interests of service providers, manufacturers and others.

million wireless data users by 2004. And although the demand for wireless expertise may have temporarily subsided, it's expected to increase during the next 18 to 24 months, says Jack Gold, an analyst at Meta Group Inc., also in Stamford.

"At that time, we could see a dramatic increase in the desire of enterprises to acquire wireless expertise for projects and application extensions," he says.

So, how do companies find IT professionals to help develop and deploy these soon-to-be-widespread technologies?

A lack of IT professionals with specific wireless applications development experience means that hiring managers are looking for people who have a strong foundation in IT and business skills. Managers are also looking for candidates who have the ability and willingness to learn new technologies quickly.

"We look for people with basic technology and business competencies and character attributes (that is, detail-oriented, visionary and others), and we try to fill in what we don't have," says Ingrid Kluth, senior vice president of systems development at Delray Beach, Fla.-based Office Depot Inc.

One such IT professional is Elizabeth Gallo, a developer at Office Depot. She had a background in IT, but it wasn't until she joined Office Depot that she had the opportunity to work directly with wireless technologies. Experience using several different programming languages — Visual Basic, VBScript, C and C++, Java and Perl — helped Gallo quickly get up to speed. She says she plans to continue working with wireless applications, in part because "the wireless space is an exciting and interesting environment to develop in. There is a tremendous opportunity for growth in the wireless market space, which will also assist in the growth of Office Depot in the future."

Instead of having a negative impact, the slowing economy has helped some larger firms find better talent. "The economic slowdown has helped us in the recruiting area in that there are more IT professionals available on the market with stronger skill sets than there were a year or two ago," says John Hinshaw, vice president of IT at Verizon. "With the demise of many dot-com companies, IT resources in the market are much more plentiful than we've seen in years."

Building applications using wireless technology requires the same fundamental skills as for any application development, says Kluth. "What's different is that the user presentation is getting more challenging," she says. To work in wireless development, at a minimum you need to have good design and presentation skills, as well as a foundation in basic HTML, she explains.

At Bedminster, N.J.-based Verizon Wireless, the largest wireless communications provider in the U.S., outside recruiting and focused in-house training help keep the IT staff abreast of the latest wireless technologies. Training programs range from technical classes on specific technologies to a company-sponsored MBA program for IT professionals.

Training is also essential for Edward Hung, a manager of the advanced research and technologies team for the City of Richmond in British Columbia. His team helped institute a wireless application that allows city planners to access water-pump analysis and trend information via any wireless device.

"This program has saved our city from [flooding] danger and gives us the freedom to create a mobile workforce and answer our flood alerts much more quickly and efficiently," Hung says.

When his six team members are put on a new project, they are offered extensive training and development such as workshops, conferences, seminars and courses. "In some cases, they are able to visit other cities or organizations to evaluate their related programs. As a result, team members are motivated by the opportunity of learning new skills," says Hung. ◗

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Cohen is a freelance writer in Washington.

ONLINE EXCLUSIVES

- IT managers have to learn to integrate wireless into a company's business practices and train IT professionals – as well as a wide range of other employees – to properly use the technology. **www.computerworld.com/q?23067**
- A top recruiter describes the hiring outlook for wireless IT professionals. **www.computerworld.com/q?23057**

KATHERINE STREETER

Roadblock
And Back

SPECIAL REPORT WIRELESS

EVERY TIME ELAINE HEIDT hears a train approaching, she flashes back to the moment that's haunted her for the past two and a half years.

It was Jan. 29, 1999. Heidt, owner of Bradeck Enterprises in Coaldale, Alberta, was on the phone with Brady Lee Fromm, a 33-year-old trucker who was passing through Portland, Ore., to deliver a miscellaneous shipment to Salt Lake City.

"I heard him scream, and then I heard a crash," she recalls. "The phone went dead. I waited for him to call me back." But the next call she received wasn't from Fromm. It was a woman who witnessed the crash and saw the Bradeck logo on the truck. She called to say the trucker had been hit by an oncoming train and killed.

"I just about fell right out of my chair," says Heidt.

An employee killed on the job is any executive's worst nightmare, and many businesses are taking notice of the dangers that wireless technology can pose to a mobile workforce. But the concerns don't end there. While many employers recognize the power of wireless technology to drastically improve the way they do business, they often find themselves stumbling into roadblocks along the way and facing new headaches introduced by the technology.

Immature wireless tools and service, security threats, and networking and integration obstacles — as well as potentially hazardous radio frequency energy emissions and the dangers of using cell phones while driving — are just a few of the problems. Then there are the cultural issues that many service-related businesses must grapple with: patrons annoyed by phones ringing in movie theatres, on golf courses and in restaurants; people speaking loudly or not paying attention to what's going on around them on trains or in office buildings; wireless devices interfering with critical equipment on planes and in hospitals. Wireless technology also affects the workforce, as employees are expected to be accessible around the clock, whether they are attending a critical meeting or relaxing at home.

"This is a technology that's still new to many people," says Travis Larson, a spokesman for the Washington-based Cellular Telecommunications & Internet Association (CTIA). "And with any technology, you have kinks, both technical and social, that need to be worked out over time."

After all, he points out, "the early adopters were considered rude for using answering machines."

But like it or not, wireless technology is becoming a major part of doing business, as well as everyday life. In January 1985, when the CTIA first started tracking the number of wireless subscribers in the U.S., there were 91,600 users. Ten years later, that figure jumped to 28.1 million, and today there are 120 million subscribers, according to the CTIA.

Still, says Larson, "wireless from the business perspective is still uncharted territory."

Why? "There's just a bunch of things missing," says Frank Gillett, an analyst at Cambridge, Mass.-based Forrester Research Inc. "The networks are a pain to set up and maintain. It's hard to make sure you have coverage across the entire space you want to cover," and connections are slow, he adds.

Then there are the integration problems. Atlanta-based Delta Air Lines Inc. has made extensive use of wireless technology during the past several years, offering agents and passengers wireless tools to handle everything from check-in to baggage routing to tracking information about seating and service on planes, says Rob Casas, Delta's general manager of e-business. "This is where we want to go," he says.

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ash

Wireless technology may transform business, but there are technical and societal barriers to overcome first.

By Melissa Solomon

But, Casas adds, there's still a lack of standardization of wireless products and services, which makes it challenging to introduce new features to a system, especially if you're dealing with different vendors.

And, of course, there are security issues. Because wireless networks broadcast signals outside an enterprise, they're more susceptible to hackers, says Gillett. The biggest barrier to corporate use of wireless, however, is the lack of quantifiable return on investment, he says.

Prepare for Takeoff

Despite the drawbacks, entire industries are racing to figure out how wireless can help them do their jobs better and how they can overcome the challenges of implementing and using the technology.

Wireless isn't seen as just a tool to help companies do business anymore, says Larry Strawhorn, vice president of engineering at the American Trucking Associations in Alexandria, Va. It has evolved into something they need in order to keep up with the pace of business and client expectations, he explains.

In trucking, wireless technology is in fairly widespread use for billing, tracing shipments and moving freight, he says. But, he adds, it's still not where it should be when it comes to vehicle maintenance, repair and management.

Global positioning systems are used to report malfunctions and make on-the-road adjustments. But, says Strawhorn, "those things are more emerging technology than they are things that are done on a daily basis."

The problem is that while the technology is ever more available, trucking firms are still asking themselves what they're supposed to do with it.

Workflow issues are a challenge, but they pale in comparison to the potential dangers that wireless technology presents for mobile workers. New York was the first and is still the only state to implement a ban on cell phone use while driving (excluding hands-free devices), but a growing number of cities and towns have implemented bans, and a handful of states have passed more limited restrictions. According to Matt Sundeen, a senior policy specialist at the National Conference of State Legislatures in Denver, 135 bills on the topic are pending in 45 states and districts around the country.

Such legislative action has heightened concern about the safety of employees talking on cell phones while driving. "That is a question we're exploring," says Strawhorn.

Scores of studies have highlighted the dangers. A 1997 report by the *New England Journal of Medicine* found that the risk of collision rises 400% when drivers are using cell phones. The study went so far as to say that driving while talking on the phone is as risky as driving with a blood alcohol level well above the legal limit.

"There's such a thing called information overload, where if you give someone too much information, they neglect part of it," says Strawhorn. If a driver neglects the information he sees outside the windshield, "that could be disastrous," he adds.

The airline and trucking industries aren't the only ones convinced that the growing pains of the wireless industry will pay off in the long run. Shipping firms and automakers are other early pioneers of wireless, offering everything from wireless-Web-equipped cars to handheld devices that can gauge temperatures of sensitive shipments.

Airborne Inc.'s Airborne Express unit in Seattle is piloting a wireless device for its truckers in Chicago. Schaumburg, Ill.-based Motorola Inc.'s HDT 500 contains an alphanumeric radio and a bar-code scanner that connect back to the office mainframe.

Currently, "what they have is a hand-held scanner and a voice radio in their truck, so they're tethered to their truck, in a sense, to communicate with the dispatcher," says Tom Zywicki, systems development director at Airborne. Having it all in one device adds a lot of flexibility, he explains.

But the project has been in the works since 1997. Airborne originally focused on a device that would rest in a truck cradle. But within a year, more mobile products started coming on the market, says Zywicki. So the rapidly changing technology has slowed the project, which isn't scheduled for companywide rollout for another eight to 18 months.

So far, the drivers in the pilot seem to like the new system, and Zywicki says he doesn't expect much resistance to a new way of working — a common problem among firms implementing any new technology.

"I'm sure we'll find isolated situations where people will have a hard time adopting the new technology. But our drivers have been using handheld scanners for 10 years plus, so they're accustomed to that technology," Zywicki says. "I would be lying if I said we didn't have these little glitches. But nothing's been showstopping."

Even Heidt is still sold on the value of wireless. To this day, she says, she's convinced that the cause of Fromm's accident was the uncontrolled train crossing. She says she never even heard a train whistle before the accident, so she knows it wasn't Fromm's fault.

"I think cell phones are good," she says. "I have one driver who doesn't have one, and it's like he's naked out there. I don't know how people used to do it in the '50s." ◗

Quick Link

ONLINE EXCLUSIVE

■ While cellular phones have added some conveniences for businesses and consumers, they've also created all-new headaches for service industries such as restaurants and movie theaters:
www.computerworld.com/q?23018

ALAN REITER

Beware of Weasel Words

I'M A DISCIPLE of the Woody Allen school of thought, which preaches that most of existence is horrible and the rest is even worse. I'm rarely accused of being overly optimistic about anything, especially "leading-edge" wireless developments such as high-speed multimedia applications.

Why? Anything leading-edge is always late. Also, major spectrum for U.S. cellular and paging services isn't likely to be allocated for years, so third-generation (3G) wireless services will have to be developed within current allocations. Besides, it's economically and technologically more difficult to offer bandwidth-intensive applications such as streaming audio and video.

SPECIAL REPORT WIRELESS

It's well known that today's so-called wireless Internet services are agonizingly slow for downloading regular Web pages, and some restrict you to accessing only specific pages. One piece of good news is that forthcoming technologies will help the wireless Internet catch up to the hype.

Global System for Mobile Communications (GSM) operators are praying that packet data services such as General Packet Radio Service (GPRS) will transform the lackluster cellular data market into a robust business with higher speeds and always-on reliability.

But beware! GSM operators and handset vendors have been churning out press releases promoting speeds of "up to" 115K bit/sec. (or thereabouts). Ask them when you, personally, will get those speeds — and at what cost. Typical GPRS rates now are 10K to 30K bit/sec., and the higher speed is only downstream to the handset.

GPRS is now available in many Europeans countries and should be in the U.S. within the next six to 12 months. Even by late next year, carriers will still probably have to employ the weasel phrase of "up to" when referring to speeds, but maximum data rates for some networks could be closer to 50K to 60K bit/sec. (though not with heavy traffic). This assumes that operators will be able offer acceptable pricing — acceptable for themselves and users — for those faster speeds.

More Wishful Thinking

Cellular operators employing Code Division Multiple Access (CDMA) technology also are weaseling out of reality, typically touting the next upgrade, called 1xRTT, in terms of "up to" 144K bit/sec.

Within another couple of years, users on 1xRTT networks could see speeds that are as fast as those of GPRS networks, or perhaps faster. One CDMA data protocol, 1xEV, promises speeds of up to 2.4M bit/sec., but don't count on that in 2002 or 2003. Count on 10% of that, maybe, if all of the stars and planets are perfectly aligned, in two or three years.

Faster data rates are only one component of creating a viable wireless business; another is usability. Handsets are great for voice, but most phones — with tiny keypads and monochrome screens — are ergonomic disasters for data.

While many of the coolest cellular phones are introduced first for European GSM networks, the U.S. gets the latest PDAs. Major PDA manufacturers have gotten the wireless religion, especially for converting business users to wireless.

In a year or two, it will be difficult to purchase any PDA that doesn't offer cellular and/or paging options. Many cellular operators, alas, will have to be dragged kicking and screaming into promoting PDAs because they view phones as the mass-market device, despite their limitations for data.

However, phone handsets will become increasingly fun — and useful — with color LCD screens and sound capabilities. Subscribers will be able to store more data, such as MP3 audio files and corporate data, as phones include additional internal memory and compact flash-type storage. Color will improve navigation and readability.

A wild card in the wireless deck is wireless LANs. If there's a proliferation of 802.11 "hot spots" — where mobile users can get shared wireless network access at 1M to 10M bit/sec. — then cellular operators who charge usurious rates for 30K bit/sec. speeds will find fewer takers.

The bottom line: Wireless already provides valuable access to e-mail and select corporate data. Speed matters, but so do many other factors, such as reliability, device selection and support. Networks will slowly get faster and more reliable. Just be skeptical of the press releases. ◗

Reiter is president of Wireless Internet & Mobile Computing, a consulting firm in Chevy Chase, Md. Contact him at reiter@wirelessinternet.com.

Wireless Snapshots

Customer Satisfaction

Corporate users who are very or somewhat satisfied with their wireless service:

1	Verizon	87%
2	AT&T	80%
3	Sprint	79%
4	Nextel	63%
(tie)	Cingular	63%

SOURCE GARTNER INC., STAMFORD, CONN (MARCH 2001) SURVEY OF 200 CORPORATE USERS

How Much Is 3G Worth?

Most business users say they're willing to spend 10% or 20% more for 3G wireless data services (above existing voice service costs):

Less than 10% more	21%
10% to 20% more	54%
20% to 30% more	15%
30% to 50% more	9%
Greater than 50% more	1%

SOURCE. GARTNER INC., STAMFORD, CONN. (MARCH 2001). SURVEY OF 200 CORPORATE USERS

Barriers to Wireless

What's holding back wireless development in North America?

- Multiple legacy mobile technologies that aren't interoperable
- 3G rollout costs
- Immature mobile content sector
- Lack of plentiful and affordable land-line services
- PC Internet experience that's far superior to the mobile Internet user experience

SOURCE: EMARKETER INC., NEW YORK

Target Devices

What devices are wireless application developers writing for?

Cell phones	59%
PDAs	57%
Wireless laptops	38%
Wireless campus LANs	28%
In-building wireless LANs	27%

Note: Multiple responses allowed

SOURCE EVANS DATA CORP., SANTA CRUZ, CALIF (2001) SURVEY OF 559 WIRELESS APPLICATION DEVELOPERS

Installed Base of PDAs in the U.S.

Estimates vary as to how many people own or will own personal digital assistants:

(In millions of units)	2000	2001	2002	2003
Consumer Electronics Association	6.1	9.6	-	-
Jupiter Media Metrix Inc.	7.1	-	-	-
The Yankee Group	8.8	13.3	19.7	26.6

SOURCE EMARKETER INC., NEW YORK

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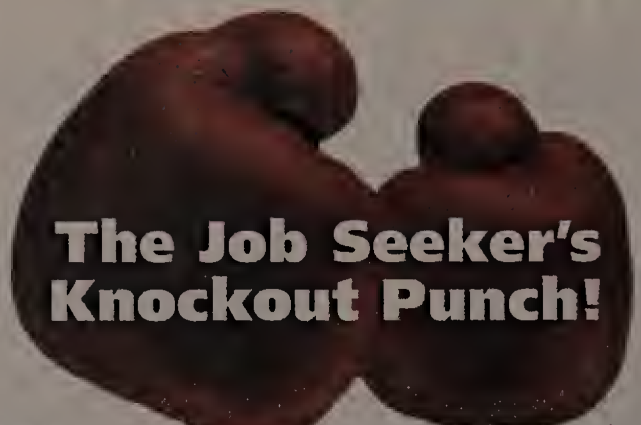

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Send resume and cover letter identifying which position you are applying for to: Corp. HR, EPI-USE America, Inc., 400 Galleria Parkway, Suite 1500, Atlanta, GA 30339 (No Phone Calls Please)

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ONEX COMMUNICATIONS CORPORATION, a suburban Boston-area company specializing in the design, development and marketing of VLSI solutions for emerging, converged communications networks, seeks to fill a number of Software, ASIC, and Systems Engineering positions, at various levels of responsibility, at our site in Bedford, MA.

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SENIOR SOFTWARE ENGINEER II - 40 Hours Per Week. 9am-5pm. $71,000 per year. Located in Miami, FL. Requires Bachelor's degree or US equivalent in Physics, Computer Science or Engineering and 5 years experience in the job offered. Work in a team environment on object oriented systems framework development. Design/develop complex major software subsystems using OOA/D, C++ and Java. Apply leading edge software engineering practices. Apply advanced CASE tool expertise. Work within a modern configuration management environment. Management and technical know-how and self-development, focused urgency. Proficiency in object-oriented analysis and design using OOA/D, C++, Java, etc. Send resume to Maria Wilson at Beckman Coulter Inc, M/C 31-B02, 11800 SW 147th Avenue, PO Box 169015, Miami, FL 33116-9015. An EOE

Software Engineer req. in NY, NY w/MS, min. 1 yr. exp. which includes archival dbase activities and dealing on as international basis. To develop, implement & maintain corp. internet/intranet and multi-site technical & archival dbases; design and develop semiconductor control software. MS SQL Server 2000. Skills: SQL, Windows NT 4.0, Visual Studio (all tools). Send Res. Attn: Recruiter, Applied Semi Conductor, Inc., 29 Broadway, Suite #2205, New York, NY 10006.

Analyst Programmer Intermediate to perform lanning, developing, testing and documenting computer applications; managing a database management system; training staff on database system; providing consultations and backup training to the Center's staff; using SQL, HTML and Visual Basic to perform above duties. Req.: BS in CS or CIS or MIS, or equivalent experience and ability to use SQL, HTML and Visual Basic to perform duties. 55k/yr., 8am to 5pm, 40hrs/wk., Fax resume to (404)651-3112. Suite 823, One Park Place, University Plaza, Atlanta, GA 30303 Attn: Les Janis. Code: WJQ0195

Jay R. Smith Mfg. Co. seeks experienced Software Engineer with WinNT, Sun Microsystems, Rational Rose, Java, Progress 4GL, HTML, XML skills and BS/MS in MIS or other computer studies. Send resume to H.R. Manager, 2781 Gunter Park Dr. East P.O. Box 3237, Montgomery, AL 36109-0237 or online at Mike.Polis@jrsmith.com

CommVault Systems, Inc. seeks Software Developers. Dev s/ware products using C/C++ for PC/UNIX platforms. Req: BS in comp sci, eng'g, or rel disc & 1 yr exp s/ware dev or s/ware engineer. Must have exp w/C/C++, Java, ASP & database applications or exp w/UNIX, C, C++, Oracle, & Solaris. Res to thoffman@commvault.com. EOE.

Systems Analyst. MS Computer Science/Engineering or related. 2 yrs. exp. as follows; Sen. Delphi Dev.; Delphi 5.0; Delphi 4.0; Delphi 3.0; PL/SQL; Postscript Sybase 11.x; Oracle 7; MS SQL Server 6.5; analysis, design; work with Delphi components in a Windows NT/95 operating environment. Exp. in development of client/server applications for securities trading firm; work with Delphi components in a Windows NT/95 operating environment. Sal. $75,350. Send resume to: Job 2, PO Box 5275, New York, NY 10185-5275.

Computer Support Specialist – consult with customers in Brazil to determine needs & prepare proposals us'g knowl of computer hardware, software, peripherals & network'g. Sales & tech'l support, advise on installation, configuration & network'g solutions, troubleshoot'g. Travel reqd. 35 hrs. $35,700 yr. 2 yrs exp. Fax resume to (954) 783-5084, Attn: Mr. Antunes.

Medical Systems Management, Inc., a Wakefield, MA based international leader in technology and services for the healthcare industry, seeks qualified Clienter/Server Developers to fill immediate positions. Must have a BS in Comp. Sci and 6 months of PowerBuilder and SQL and relational database experience. Please send your resume to: Lori McCarron, Human Resources, MSM, 200 Quannapowitt Pky, Wakefield, MA 01880

Several positions available. Requirements and salary vary per position. Send resume to: Watson, A.M.I., 6145F Northbelt Parkway, Norcross, Georgia 30071.

Sr. Software Engineer, wanted by optical networking system developer in Oceanport, NJ. Must have a Bachelor's of Science in Computer Science, Electronics Engineering, or Technology and 5 yrs. exp. in job offered or in Software Development or a MS degree in the same field of study plus 3 yrs. of exp. in job offered or in Software Development. Respond to Doreen Connors, HR Department (ref# 047), Tellium, Inc., 2 Crescent Place, Oceanport, NJ 07757.

Software Engineer: Analysis, design, development and implementation of computer software for Framemaker and Oracle/Access databases using Java/C++ in Windows NT and Unix environment; develop web applications using Javascripts, ColdFusions and Oracle. MS in Comp Engg, Elec Engg, or Comp Science. Send resume: HR Dept, Key Data Solutions, 675 Line Rd, Aberdeen NJ 07747.

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WEB DEVELOPER. Layout/code internet & intranet websites in Java, Solaris, Windows NT environments; B.S. degree + 1 yr exp req.; Send resume to S. Batista, Logical Design Solutions, 131 Madison Av., Morristown, NJ 07960. (TM)

Systems Analyst. M.S. Computer Science or related. Intranet manager. 1-2 yrs. exp. maint. and devel. heavily used intranet site; devel., upgrade, and maint. trading software systems; Delphi 5.0; Delphi 4.0; Delphi 3.0; PL/SQL; Postscript; Sybase 11.x; Oracle 7; MS SQL Server 6.5; 1-2 yrs. development of office integration applications. Sal. $43,600. Send resume to: Job 4, PO Box 5275, New York, NY 10185-5275.

Information Architect wanted by Int Mktg Communications Co in Manh. Responsible for leading Information Architecture for client internet, intranet & extranet; dev functional requirements, site maps & functional specifications. Bach of Arts in Communications, Media or Comp Science & 2 yrs exp in job offered or 2yrs as Internet or Web Site Analyst req. Respond to: HYL/HR Dept, P.O. Box 4241, GCS, NY 10163.

Systems Analyst. Masters degree in Systems Analysis or related. 2 yrs. exp. as follows: Oracle Developer; Oracle 7; Oracle 8i; SQL Server; PL/SQL; BEA Web Logic; PL/SQL; Java; Vingette; Pro +C; VB Script; Unix operating system. 2 yrs. exp. in application development and database design for use in financial services firms. Sal. $75,350. Send resume to: Job 1, PO Box 5275, New York, NY 10185-5275.

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Send resume to: Sagarsoft, Inc, 78 Eastern Blvd, Glastonbury, CT 06033

SENIOR SOFTWARE CONSULTANT (Bellemead, NJ). Design and develop business and internet/intranet applications using JAVA, C++, C, Oracle, PL/SOL on UNIX platforms. Must have MS/BS in Computer Science or Engineering plus relevant experience. Send resume/cover letter to: Manohar Gadiraju, Gadiraju Technologies, Inc., 138 Ketcham Road, Bellemead, NJ 08502.

Computer Programmer. Masters degree in Systems Management or related. 2 yrs. exp. as follows: Delphi 4.0; Delphi 3.0; Delphi 2.0; Oracle 7.3; Microsoft SQL Server; Oracle Server; Sybase Server; MS FoxPro; database and system design in a Windows NT/95 operating environment. 1-2 yrs. exp. in development of client/server applications for securities trading in financial institutions. Sal. $69,700. Send resume to: Job 3, PO Box 5275, New York, NY 10185-5275.

UNIX Administrator wanted by Syst Design Co in Manh. Install, configure & perform maintenance of operating systems, network applications, servers & hardware; oversee UNIX systems, administration, setup, database. MS in Engineering or Comp Sci & 1yr exp in job offered req. Respond to: RCS/HR Dept, PO Box 4241, GCS, NY 10163.

Software Engr needed for computer consulting firm. 35 hrs. $16 hr. B.S. (or equiv) + 1 yr exp. Fax resume to (305) 248-2415, Attn: Mr. Patel.

Computer Programmer. B.S. Mgmt. Info. Sys. or related. Min. of 2 yrs. exp. as follows: Oracle 7; Oracle 8i; Developer 2000; SQL Server; PL/SOL; Oracle Reports; Unix operating systems; application devel. and database design in Windows NT/95 operating environment; 2 yrs. exp. in application development and database design for use in financial services firms. Sal. $69,700. Send resume to: Job 5, PO Box 5275, New York, NY 10185-5275.

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Manager of Information Systems needed for Internet Service Provider to develop and improve information systems functionality. Min req. Bach degree in Systems Engineering and 4 yrs exp. Send resume Attn. Human Resources IFX Corporation 15050 NW 79th CT., #200 Miami Lakes, FL 33016. Ref: 222

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To apply, please contact: HR Dept., SVI America Corp., 15800 John J. Delaney Drive, Suite 250, Charlotte, NC 28277 or E-mail: HR_ADMIN@SVIAMERICA.COM

Software Engineer sought by Premier Alliance Group, Inc. for Raleigh, North Carolina office. Must possess a Bachelor of Science (B.S.) degree in engineering or computer science (or the foreign equivalent), plus two (2) years experience in software development. Demonstrated expertise designing object oriented, distributed architecture systems using Visual Basic, Visual C++, Java. Experience working with relational databases including Oracle, SOL Server, DB2. Experience in technical analysis/documentation/testing of software systems. Respond to: Human Resources Manager, Premier Alliance Group, Inc., 4521 Sharon Road, Ste. 300, Charlotte, NC 28211.

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ADDENDUM

Systems Analyst. Design, develop, & implement software applic. using Java, JSPs, JavaScript, HTML, XML & BlueMartini on PC/Windows NT & SUN/Solaris for e-commerce & MIS div. Develop COOL:2E generated applic. on AS/400 environment. Modify COOL:2E data models, functions, & native RPG/400 & CL/400. Plan, estimate, recommend, coordinate, & participate in development, implementation, & maintenance or projects. Design business systems at conceptual level & guide development staff members in technical levels of system design. Design logical & physical databases. Develop, document, & recommend specific automated procedures according to specific business system reqs. Req. Master's degree or foreign equiv. in Computer Science/related field. EOE. Send resume to Patricia Ryan, Human Resources, Belk Stores Services, Inc., 2801 W Tyvola Rd. Charlotte, NC 28217.

APAR INFOTECH CORPORATION

Positions available for Accountants, Human Resource Managers, Market Research Analysts, Recruiters/Technical Recruiters and Software Sales Engineers.

Accountants require: Master's degree in Commerce, Accounting, or related field; OR Bachelor's degree in Commerce, Accounting, or related field plus five (5) years of post-baccalaureate, progressive work experience in accounting industry Must be knowledgeable and proficient in India and Singapore international taxation laws and financial practices, and Reserve Bank of India rules and regulations.

Human Resource Managers require: Master's degree in Human Resources, Personnel Management, Business Administration or related field and two (2) years work experience in human resource management or related fields; OR Bachelor's degree in Human Resources, Personnel Management, Business Administration or related fields and five (5) years progressive work experience in Human Resource Management or related fields. Must be computer literate, experienced with multinational employees and have at least two (2) years experience with a computer software services company.

Market Research Analysts require: Master's degree in Business Administration or related field and two (2) years experience in Market Research/Product Management or related field; OR Bachelor's degree in Business Adminis-tration or related field and five (5) years progressive work experience in Market Research/Product Management or related fields. Must be knowledgeable and proficient with PC software and market research software tools and packages.

Software Sales Engineers Require: Master's degree in Engineering or related field and two (2) years experience in sales and marketing of sophisticated technical products and services; OR Bachelor's degree in Engineering or related field and five (5) years of progressive work experience in Sales and marketing of sophisticated technical products and services. At least two (2) years experience with a computer software services company is needed.

Technical Recruiters require: Bachelor's degree, or equivalent, in Business, Personnel Management or a related field and three (3) years work experience in the computer software services industry, including experience in software development, computer architecture, software estimation and implementation planning, recruitment and staffing. Must be knowledgeable and proficient in computer systems.

Qualified applicants should submit a resume and cover letter, clearly indicating the position for which the applicant is applying, either by email to recruiter_sept@apar.com, or to Soum Rathod, Apar Infotech Corporation, 160 Technology Drive, Canonsburg, PA 15317.

PROGRAMMER to develop, write, test, maintain and support computer programs using MF-COBOL, VS-COBOL, COBOL/400, JCL, C, RPG/400, CL/400, SOL/400, SOL, and OUERY/400, DOS, OS/400 and OS/390 on AS/400 and S/390 machines. Require: B.S. degree in Computer Science, an Engineering discipline, or a closely related field, with two years of experience in the job offered or as a Systems Analyst. Competitive salary offered. Send resume to: Michelle Murphy, Director of HR, Atraxis North America, 1899 Powers Ferry Rd, Ste 430, Atlanta,. GA 30339; Attn: Job AS.

Programmer Analyst - Legacy Systems (AS/400) - Multiple Openings

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C/S Developer needed to play a lead role in the implementation of IT projects and the coordination of application maintenance and enhancements/upgrades in the Energy Trading environment. Must have 4-year college degree (Computer Science or MIS degree preferred) and five years of directly related experience; or an equivalent combination of education and/or experience. Requires 5+ years of information systems development experience with at least two years of supporting Oracle development. Must have 2+ years of experience in the design, development, testing and modification of reports and forms for the Nucleus system. 10% travel possible. Must have experience supporting a 24x7 business operation and the ability to provide on-call support. For immediate consideration, contact us at: jobs@pgnmail.com. Please include PGN9829-006 in your e-mail; do not forward a resume in this message. We will then forward a fast link to apply for this job. Or, forward your resume, including PGN9829-006 to: Progress Energy, P.O. Box 1551, Mail Stop 5A5, Raleigh, NC 27602; FAX (919) 546-2435. For other employment opportunities, visit our website: www.progress-energy.com. We are an equal opportunity employer.

American Information Technology Corporation has openings for software engineers for locations in Texas or elsewhere, with at least 2 years of experience in the position or as an Analyst Programmer/System Analyst. Job duties for positions include: research, analyze, design, develop, test, and implement software applications using the following technologies:

- Internet/Intranet
- Web Development
- UNIX
- Windows
- Client Server
- Midrange
- Mainframe
- Datawarehousing
- Network/Database Administration

Positions require a Master's degree (or Bachelor's degree plus five years experience) as well as experience and/or training in these skills. Excellent pay and benefits. Mail resume to: American Information Technology Corporation, 3204 L. Prairie Road, Suite E, Flower Mound, TX 75022.

Internet Infrastructure Architect - Responsibilities include design, deployment of large sized corporate Intranets, Extranets based on Netscape Directory servers (ldap based), messaging and enterprise servers. Must be well versed with Unix as well as NT platforms, conversant with various Internet open standard based technologies like CGI, HTTP, SMTP, IMAP, TCP/IP. Also includes integrating mission critical business applications over distributed platforms and operating systems. Requires Bachelor of Science or equivalent in Computer Science, Engineering, Computer Engineering, or a related field AND one year of experience. 40 hrs./wk. 8:00 am - 5:00 pm. $43.27/hr. Position in Levittown, PA and various, unanticipated client locations. Submit resume or C.V. to: The Phila. Job Bank, 444 N. 3rd Str., 3rd Floor, Philadelphia, PA 19123. Job Order WEB195881.

SENIOR SOFTWARE ENGINEER to design, develop, implement, test and maintain AMISYS applications for health insurance industry clients using COBOL, PL/SOL, Powerhouse, IMAGE, Adager and OCS Express on HP3000 machine; Participate in data migration using JCL and Suprtool; Ensure that goals and objectives of projects are accomplished within prescribed time frame and funding parameters; Supervise and mentor junior programmers and engineers. Require: B.S. degree in Computer Science, an Engineering discipline, or a closely related field with five years of progressively responsible experience in the job offered or as a Programmer/Analyst. Extensive travel on assignment to various client sites within the U.S. is required. Competitive salary offered. Apply by resume to: Rajender Gaddam, Director of HR, Orpine Enterprises, LLC, 1004 Crooked Creek Court, Mableton, GA 30126; Attn: Job RR.

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To be considered immediately for this position, send your resumes with salary history to Marci Whitaker; careers@commandalkon.com; Command Alkon; 1800 International Park Drive Suite 400; Birmingham, AL; 35243. Fax: 205/870-1405 Resumes without salary history will not be considered.

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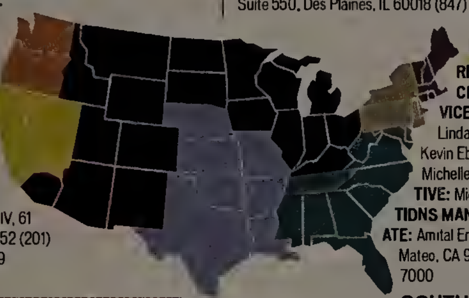

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Preparedness

in New York, the crippled Pentagon building in Arlington, Va., and the fatal plane crash in Pennsylvania.

Before the first warning about cyberthreats hit the wires on Tuesday, Ciurylo had his team check all Internet access points and e-mail systems to ensure the security of the information network of the Northeast's largest utility firm.

That extra effort might have been as much an emotional response to an unprecedented situation as it was one of crisis management. Because, Ciurylo said, "there wasn't anything we needed to change in our preparedness plans that would have added extra security."

Most companies claimed that their IT protection plans will work. Lincolnshire, Ill.-based Hewitt Associates LLC is certain that its fully mirrored data center architecture protects the firm against catastrophic failures in its primary facility, said Dan Kaberon, a data center manager at the company.

At The Boeing Co., spokesman Robert Jorgensen said that the company's disaster-recovery centers were opened and fully staffed. Representatives from IT and other company operations used an open toll-free phone line at regular intervals to verify that systems were working. The Chicago-based aerospace giant had just completed a full test of the system two weeks previously.

"We always have the pilot on, but now we've turned on the front burner," Jorgensen said.

Electronic Data Systems Corp. in Plano, Texas, immediately pulled staff from other areas to increase IT personnel in data centers dedicated to its clients in the airline industry such as American Airlines Inc. and Sabre Holdings Corp. "They needed the most support," said EDS spokesman Tom Mattia.

Near ground zero in lower Manhattan, J.P. Morgan Chase & Co. swung into action with a plan that included a variety of mobile communications tools to keep IT operations working amid the chaos.

"Our crisis-management team has set up a hot line and electronic communications," said Alex Hu, vice president of audit technology at the financial giant.

He said the area had been evacuated, which meant his company had to focus on mobility, with tools such as "laptops, PDAs, VPN, BlackBerries, [which] will serve us well, since we expect a great deal of telecommuting in the next few days."

Another IT manager, at a midsize company in Midtown Manhattan, who asked to remain anonymous, said his company's Y2k work almost two years ago paid some dividends by having codified "plans to work remotely and communicating [situation] status with employees." ◗

Matt Hamblen, Lee Copeland, Kim S. Nash and Jaikumar Vijayan contributed to this report.

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Volunteer

$230 million in assets, Henricks knew there was, at the very least, technical expertise that workers could offer the victims.

"I'm sure that these people had disaster plans in place after the World Trade Center bombing [in 1993], but how many tech people were lost? Are these companies going to be able to fully recover?" asked Henricks, who put out e-mail messages to various contacts to see if they knew of IT relief efforts under way.

On Thursday, *Computerworld* began building a database of IT volunteers and donors *(www.computerworld.com/volunteer)*. Within an hour, hundreds had offered to pitch in.

Casey Karel, a member of the Corporate Volunteers of New York and director of New York-based Credit Suisse First Boston Corp.'s foundation, which donated $1 million to the relief efforts, said she was just starting to hear on Thursday from affected businesses about the help they need. As more come forward, Karel said, she plans to connect them with those signing up at *Computerworld*'s Volunteer IT site.

"I think everybody is numb still," she said. "But they want to do the right thing."

Germany-based Siemens AG had about 75 people in the World Trade Center, so executives' first concern was for the well-being of staff, said Marty Cravatta, information security manager for the Americas at Siemens. But once everyone was accounted for, managers looked at the bigger picture and decided to offer logistical services to others that operated in the towers, he said.

After accounting for all of its employees, Paris-based Cap Gemini Ernst & Young came forward with offers of fully equipped office space and support volunteers in its advanced development center, located about a block from the New York Stock Exchange. The plan is to use the space, with about 250 to 300 desks, as a sort of triage center to help businesses move critical projects forward, said Lanny Cohen, vice president of strategy and technology services. "The idea started to germinate as early as Tuesday evening," he said. "We said, 'Tomorrow, the sun's going to come up, and we've got to react.' "

West Chester, Pa.-based United Messaging Inc. also rallied to action, with offers of free e-mail services for companies that operated in the World Trade Center.

"Because we serve large enterprises, we realize how critical e-mail is to them," said Len Gangi, United Messaging's senior vice president of product development and engineering. "We have services available — let's make those services available to companies in need."

The need is certainly there, not only for individual businesses, but also for the IT infrastructure at large, said Edward Roche, chief research officer at The Research Board Inc. in New York. The devastation at the World Trade Center knocked out major routers, blocked switches, destroyed trading floors and crippled emergency backup systems, he said. "The systems are overwhelmed," said Roche. "Everything's broken."

New York-based IT volunteer organization Voluntech had its network routed near the World Trade Center, so its e-mail was down well into Wednesday. But as soon as the system was back up, Eric Hancock, one of the group's cofounders, began listing tips for volunteers on its Web site, *www.voluntech.org*.

Harrisburg, Pa.-based TransCore Inc. mobilized its transportation industry business-to-business network to get 700 trucks to the World Trade Center to help with disaster-relief transportation needs.

In many cases, the costs for businesses were substantial, but no one seemed to be talking about that last week.

"There are only two things that make our business go: our people and our clients," said Cap Gemini's Cohen. "So that isn't an issue." ◗

Helping Hands

Services, support, software, supplies: Offers for donations to businesses in and around the World Trade Center keep rolling in. Here's a sampling:

Verio Inc.: Co-location space and bandwidth in Newark, N.J., office. Contact Jim Quinn at (212) 768-9455.

Computer Associates International Inc.: $2 million to children who lost a parent, and pro bono data and computer restoration assistance. See *http://ca.com/emergency_support/index.htm.*

3rd Millennium Management LLC: Assistance in communicating to employees and their families and to customers and investors. Call (973) 633-0888.

Bowne & Co.: Printing services, design and project management and volunteers. E-mail Bill.kling@bowne.com.

Veritas Software Corp.: Technical response teams to aid in disaster-recovery efforts. Call (800) 634-4747.

Meta Group Inc.: Office space, phone and Internet connections. Also pulling together an industrywide task force of analysts and advisers to offer businesses and government relief agencies telecommunications data recovery and networking and operations assistance.

Verizon Wireless, Cingular Wireless, Sprint PCS Group, AT&T Wireless Services Inc. and Winstar Communications Inc., among others: Free cell phones for businesses and relief workers.

MORE NEXT ISSUE

IT workers don't pull together just during times of crisis. Read next week's *Computerworld* to learn how companies rally their IT troops day in and day out.

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BPA ABM RED TAG

FRANK HAYES/FRANKLY SPEAKING

Our Changed World

LAST TUESDAY MORNING, OUR WORLD CHANGED. Someone had discovered that a transcontinental commercial airliner can be a flying bomb. They used that knowledge to murder thousands of people at the World Trade Center towers, more than a hundred in the Pentagon and hundreds more among the passengers and crews of four airliners.

For the innocents who were killed and the police, firefighters and medical people who died trying to save the lives of others, the story is over. For those who survived, and the rest of us who dodged this bullet, things will never be quite the same.

My family dodged the bullet. My brother-in-law, who works at the Pentagon. My sister, who was supposed to be in an office a few blocks from the World Trade Center. Her brother-in-law, a New York City firefighter.

Like many of you, I learned that my loved ones were all alive only after several awful hours of waiting on Tuesday. The information came in fits and starts. The Internet kept running, but it didn't help much. My relatives ended up using the conventional telephone system, which held up remarkably well, outside of Manhattan and Washington, even though the whole country was trying to get through, too.

Overburdened? Yes, and sometimes overwhelmed. But the IT and telecommunications infrastructure didn't collapse.

What *did* collapse were our ideas of security.

In the past, IT people worried about hackers and viruses and cyberterrorism. That was where our security worries were.

We didn't worry about airport security — that charade of flashing ID, a yes, a no and a quick pass through an underpowered metal detector. We knew it was window dressing. We knew antiterrorism experts regularly demonstrated how easy it was to smuggle through knives and even guns. But it was fast. We *wanted* fast.

And as air travel became the nearly friction-free silent partner of technology in the Internet revolution, the outsourcing revolution and the supply chain revolution, we wanted it even faster.

We wanted to move executives, IT staff, consultants and contractors around the country almost as easily as e-mail on a network. We wanted them to zip through the front entrance of any American airport 20 minutes before departure time and still make the flight.

In the rest of the world, where serious security measures against terrorism have been a fact of life for years, that scenario was unthinkable.

We've just joined the rest of the world.

In the days to come, the murderers will be tracked down. The financial markets will reopen. The rubble will be cleared, the offices rebuilt. Life — and business — will go on.

And the planes will fly again. But we'll no longer be able to sprint through airports and carry pretty much what we please on board.

We'll stand in longer lines for lengthier security checks. We'll expect rigorous searches of any carry-on luggage containing anything that looks even slightly odd on the X-ray machine. We'll learn not to take that laptop if we can do without it and not to carry other nonessential electronic items.

We'll miss a few flights because we didn't get to the airport early enough, or we forgot to carry confirmation of our electronic tickets, or something suspicious about us or what we carry led airport security to search us very, very carefully.

We won't like it. We'll grumble and wish for the old days. But we'll learn to live with it.

Because while many of us know people who dodged the bullet or made it out alive, most of us also know of someone who didn't.

And the delays, the inconvenience and the cost of that greater security is well worth the price if it means that a day like Tuesday, Sept. 11, 2001, never happens again. ◗

FRANK HAYES, *Computerworld*'s senior news columnist, has covered IT for more than 20 years. Contact him at frank_hayes@computerworld.com.

SHARK TANK

PILOT FISH can't get approval to buy an uninterruptible power supply for a system with flaky power. OK; how about an electrician to check the lines? he asks. But no one can locate the electrical wiring plans. "I'm not sure where they are," says boss. "Can't you just go down to the power panel and flip switches until you find the right circuit?"

PROGRAMMER trainee, working on his first batch report, can't get the number of records to come out right – it keeps showing three records too many. Finally, he manages to get it correct. Congratulations, says IT pilot fish training him. How did you fix the problem? "It was easy, once I thought about it," says trainee. "I just initialized the records counter to -3."

DURING A MEETING with system staff members of a partner company, IT pilot fish mentions in passing that one of his shop's mission-critical NetWare servers hasn't needed restarting in three years. "That's crazy," says staffer from the other outfit. "I can't believe we've teamed up with a company that's still using something three years old!"

WHAT WERE YOU doing just before your PC refused to reboot? pilot fish asks user. "Just deleting some files, because I ran out of disk space," she says. Which files? "The ones in the Windows directory." Why? "Because Windows was already installed and working fine."

IT MANAGER asks pilot fish to bring in his digital camera the next day. "We'll be doing team-building exercises, and it would be nice to get pictures." Of course, no problem, says fish. "Don't worry," boss adds, "we'll pay you back for the film."

This week, let's forget about Shark shirts. But if your company can donate IT goods or services to help in the wake of the tragedy in New York, please log on to **computerworld.com/volunteer**. And call (800) GIVE-LIFE or your local Red Cross chapter to make an appointment to give blood.

The 5th Wave

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"I just can't keep up with the cosmetics industry. That woman we just passed has a makeup case with a screen and keyboard."

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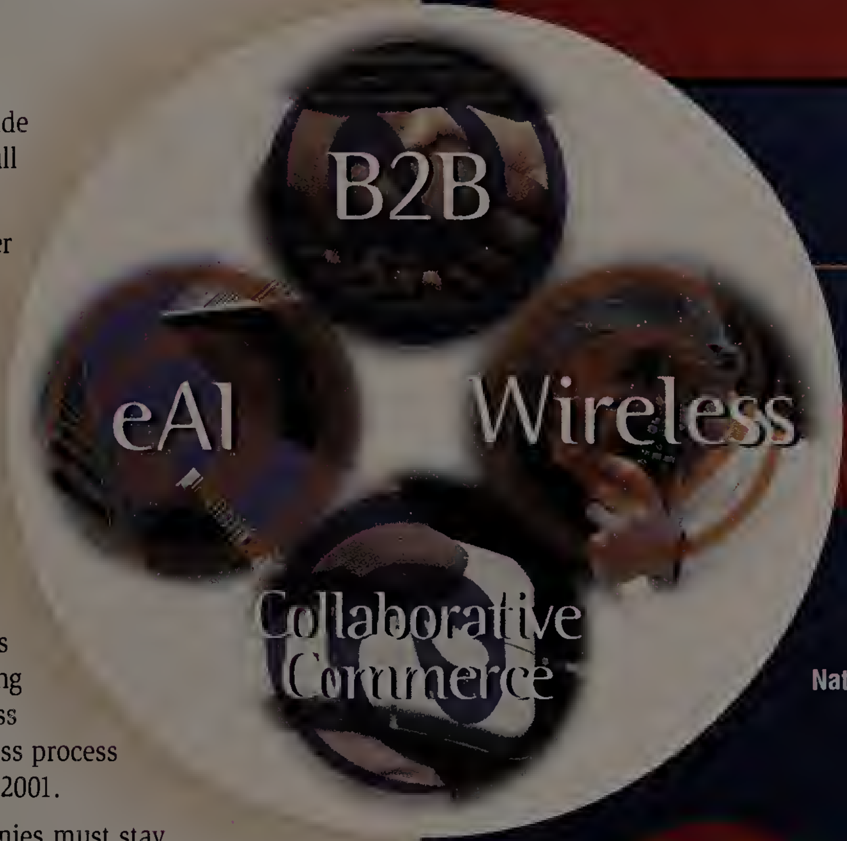

The Changing Face of E-Business Integration

B2B strategies have shifted dramatically, the importance of operational systems and data is greater than first perceived and organizational transformation has emerged as a critical success factor. Companies are learning why incorporating integration into the design stage of an e-business project is so essential and have declared business process integration as one of the most critical issues of 2001.

Last year's approaches no longer apply. Companies must stay current as the e-business integration agenda is reshaped on a continuing basis. Applying yesterday's strategies can topple well-intended e-business integration plans. Staying current means engaging in an ongoing dialog with industry peers and experts – the individuals on the cutting edge of e-business integration.

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Wednesday, Sept. 19th

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Executive Guide to Wireless Data & Mobile Internet
Global Integration: Meeting Business Challenges
Integration Solutions for the Corporate Enterprise
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Integration Hits the Boardroom
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